The Newspaper of Information Systems Management
June 14, 1993, Vol. 27, No. 24, 156 Pages, $6/Copy, $48/Year

COMPUTERWORLD

Inside

OOP!

You've heard the hype; now here's the scoop on OOP. Users of object-oriented programming tools told *Computerworld* they're seeing productivity increases of up to 50%. They also report some success with code reuse.

But for now, there is still more tire-kicking than OOP production. Training is one obstacle; another — and a major hole in the technology — is a lack of business-oriented class libraries. *Page 107*

Meanwhile, it doesn't look as though object DBMSs are going to take over, according to consultant Fabian Pascal. He says relational DBMSs are a better bet than object DBMSs, which are inflexible and need a lot of manual labor to maximize applications performance. *Page 127*

IBM to reveal ATM plans

Products, architecture to roll in 18 months

By Elisabeth Horwitt
NEW YORK

■ IBM plans soon to make the first announcements about its long-rumored Asynchronous Transfer Mode strategy and will start rolling out products within 18 months, said Rick McGee, IBM director of networking systems architecture, last week.

One major piece of that strategy is Broadband Networking Architecture, which will provide ATM management features such as congestion control and give popular local-area network protocols access to ATM's 1G bit/sec. speeds.

IBM plans to elicit input from other vendors and to propose the architecture as an industry standard, possibly through the ATM Forum, McGee said.

IBM will also provide the first official details on the high-speed switches it has been developing overseas, an IBM spokesman confirmed.

One switch will support both ATM and Packet Transfer Mode, which is an IBM version of ATM that uses variable-length instead of fixed-length packets.

IBM users at the InterLab, Inc. New SNA conference said they were less interested

ATM plans, *page 15*

IS 'heroes' honored at award gala

William Habeck beams from behind the Computerworld Smithsonian Transportation Award he collected for Bay State Shippers of Boston, which won for its on-line rail information system. For a more in-depth look at the fifth annual awards ceremony and some of the winners, please turn to pages 28 and 39.

Client/server strategy

Compaq end runs midrange makers

By Michael Fitzgerald
HOUSTON

After gaining on the minicomputer market for four years, Compaq Computer Corp. said it expects to match its midrange brethren starting this fall with a major server and network management announcement. The move would bring true large-scale systems capabilities to PC servers for as little as $5,000, a Compaq official said last week.

Toward that end, the PC server leader plans to release its first server line designed from the ground up to run mission-critical applications, according to Virgil Hornstein, Compaq's director of systems marketing, North America.

The servers will boast a variety of mainframe-like features not found on the PC level before. They include the following:

- Monitoring software that will warn local-area network administrators if system components appear ready to fail, so the parts can be replaced ahead of time.
- A built-in, unlimited power supply with an orderly power-down procedure.
- System utilization monitors for performance tuning.
- Support for up to four processors.

Compaq will add other useful twists to its products as well. For instance, the servers will feature built-in CD-ROM drives to enhance software distribution.

> "I've been asking for this for 2½ years."
> — *Paul Bandrowski, Sara Lee*

Hornstein said Compaq has found that it takes even experienced LAN administrators more than one try to successfully install massive and complex products such as Novell, Inc.'s NetWare and that the installation process can take as long as 10 hours.

Consequently, Compaq is building CD-ROM versions of products such as NetWare with Compaq-designed scripts to make installation error-free and reduce install time to as little as 45 minutes.

Hornstein said Compaq will roll

Compaq, *page 14*

Low PC tags have their price

Backlogs, shorter life cycles bedevil buying plans

By Michael Fitzgerald

Analyzing what has happened in the PC hardware arena since Compaq Computer Corp. made its bombshell announcement of low-price PCs a year ago, two things are clear: Users pay less for systems, but product life cycles are shorter and backlogs take longer to fill.

Users said they like the price cuts, but some were venomous about backlogs and many protested product life cycles that have shrunk to as little as six months. Shorter life cycles, coupled with falling gross profit margins for PC vendors, raise the specter that vendors will not be able to continue investing in research and development over the long term.

"As a technologist, I love the shorter product life cycles, but as a budget manager, product life cycles are a nightmare because our investment doesn't last nearly as long as it used to," said Louis Kahn, chief network administrator at the Centers for Disease Control and Prevention's Immunization Program in Atlanta.

Vendors beyond reach

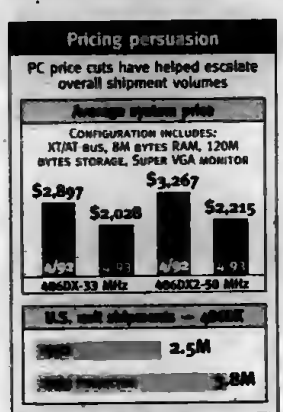
Numerous users also complained that they have less contact with their vendors now than in the past, particularly with IBM and Compaq.

"Customer service lives up to my expectations, but I expect to get less than adequate service from these people," said Gerald Reid, director of information systems at the New York law firm of Milbank, Tweed, Hadley & McCloy. Reid said his firm recently started buying from

PC prices, *page 12*

Pricing persuasion

PC price cuts have helped escalate overall shipment volumes



Source: Metro Computing, Cherry Hill, N.J., and International Data Corp., Framingham, Mass.

Compaq said it sold 94,000 units in the U.S. in first-quarter 1992, a poor showing for the PC maker. This year, its first-quarter U.S. unit sales were up 248% to 327,000 units, including 178,000 in March alone.

Newspaper
BBXBBJFT&******** 5-DIGIT 48103
$UIUTZE3OOM0990398 0050108214
UNIVERSITY MICROFILMS INT 0784
UNIVERSITY MICROFILMS INT 6 XC
SERIAL PUBLICATIONS
300 N ZEEB RD
ANN ARBOR MI 48103

[redacted]

PC SOFTWARE

Microsoft and Lotus took turns heating up the airwaves last week. **Microsoft** unwrapped a Windows framework designed to link office machines that garnered support from 60 vendors. *Page 2.* **Lotus**, meanwhile, bought **Approach** and plunged into the contentious Windows database fray. Separately, it is readying plans to add Notes to its application suite. *Page 4.* And Adobe ushered in the "electronic paper era" with the release of its Acrobat portable document format. *Page 24*

RE-ENGINEERING

A re-engineering project at **Lincoln National Life** resulted in a client/server system that accommodated the need to keep the look and feel of paper documents. *Page 48*

CLIENT/SERVER

Don't confuse getting rid of the mainframe with client/server. Think of client/server in terms of what the software does, not the platform it runs on. *Page 66*

UNIX

Unix support cropped up everywhere last week. DEC belatedly joined COSE, citing as the reason for the delay concerns abont how COSE's process for creating Unix standards worked. *Page 14.* Meanwhile, USL is moving its **System V Release 4.2** operating system to the microkernel architecture. *Page 8*

E-MAIL

Beyond will unwrap a mail package this week with built-in work-flow applications and imaging support. *Page 4*

Technical Sections

Advanced Technology	33
Application Development	93
Desktop Computing	45
Enterprise Networking	73
Large Systems	81
Workgroup Computing	65

Departments

Calendar	104
Company Index	147
Computer Careers	132
Computer Industry	149
CW Guide	107
Editorial/Viewpoint	36,37
Friday Stock Ticker	148
In Depth	127
Management	99
Marketplace	140

BEST COMPUTER NEWSPAPER 1992 COMPUTER PRESS ASSOCIATION

A PUBLICATION OF IDG

Microsoft takes on the office

'At Work' backed by 60 vendors with component products

By Lynda Radosevich
NEW YORK

■ In the latest attempt to define a standard for the interaction of office devices, Microsoft Corp. last week unwrapped a software framework said to allow PCs, copiers, fax machines and telephones to communicate with one another over local-area, wide-area and wireless networks using Windows technology.

Lending weight to the announcement was the endorsement of 60 vendors, including several that demonstrated products or laid out specific plans for products to come. The first product to use a component of the new software is a printer from Hewlett-Packard Co. that is shipping now. Fax machines (see box) are expected to ship by year's end.

Called At Work, the framework includes a software development kit based on two Microsoft interfaces: Messaging Application Programming Interface, or MAPI, and the company's recently announced Telephony Application Programming Interface.

Benefits of this architecture will include the ability to manipulate office machines from a Windows screen on any peripheral device or desktop computer; to store fax, voice and electronic communications in one directory; and to enable the devices to share editable documents.

Certain capabilities, such as sending and receiving editable faxes from networked PCs, already exist. So what Microsoft is really adding here, users said, is the ability to unify the methods that various vendors use to link their devices.

"I think Microsoft is the best positioned to do it because they dominate operating systems and have tight links to the hardware vendors," said Ed Benack, an operations manager at a large Northeastern telecommunications firm. He added that the effort is something he would have liked to see 10 years ago. Other users agreed.

When manufacturers will add the At Work software to their machines, however, depends on when Microsoft delivers the tool kit, which it promised will be available this summer, said a spokesman at Xerox Corp. Xerox endorsed the At Work software and said it plans to build fax machines, printers and digital copiers that integrate with PCs.

Additionally, manufacturers must pay an undisclosed licensing fee for At Work software, a fact that is likely to have the biggest impact on pricing for low-cost items such as phones because the fee represents a larger percentage of the item's total cost than in higher priced items, according to Amy Wohl, president of Wohl Associates, a consultancy in Bala Cynwyd, Pa.

For Roy Gregory, manager of personal computing at food wholesaler Scrivner, Inc. in Oklahoma City, a standard approach to linking office equipment is worth more money.

"If it looks like a definite industrywide standard, I would be willing to pay a little more [for At Work-compliant products], possibly 5%," said Gregory, who is looking for networked fax hardware and software.

Besides indirect costs, users would not have to pay for At Work software because Microsoft Chairman and Chief Executive Officer Bill Gates said it will be included in the next major releases of Windows and Windows for Workgroups operating environments.

A look under Mobile Companion's hood

With Microsoft's At Work announcement came the first fruits of its Frontline Partnership with Compaq Computer Corp. [CW, April 19]. Compaq announced its Mobile Companion, a 1- to 2-pound 486-based tablet that uses pen input and wireless communications and was designed to work within the At Work framework.

Mobile Companion, an entirely new type of product for Compaq, will not hit the market until sometime in 1994 and will carry a price tag below $2,000, said Lorie Strong, Compaq's vice president of portable and software marketing. She said several hurdles must be cleared before the product is introduced, notably the creation of software that will synchronize data between a mobile companion and a deskbound PC and better wireless communications standards.

Compaq said it expects the Mobile Companion to be used as a second digital device by business users, as opposed to products such as Zoomer from Tandy Corp. and Casio, Inc.

Introducing SyncSort for UNIX

The World's Leading Sort Is Now Available for UNIX

Full Functionality

Lightning Speed

World-Class Customer Service

Call
(201) 930-8200
to get your copy today.

syncsort

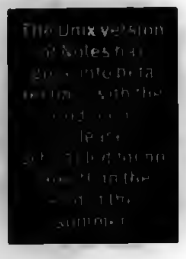
Notes will join SmartSuite

User needs drive Lotus to add groupware to package

By Michael Vizard
CAMBRIDGE, MASS.

As suites become the dominant force in selling Microsoft Corp. Windows applications, Lotus Development Corp. is looking to leverage some of that momentum with sites that have adopted its Notes groupware offering.

Though the details are still being worked out, Lotus plans to offer a version of SmartSuite that will include Notes at a higher price than the current $750 charged for SmartSuite, said Cliff Conneighton, director of Notes marketing.



Setting the stage for this is the scheduled arrival next month of Version 2.0 of SmartSuite, which will include the ability to easily reformat files across diverse applications using Notes as an intermediate transport.

Customer requests are driving Lotus to offer Notes as part of a suite, Conneighton said.

Full suite

Among those customers is Waste Management, Inc. in Lombard, Ill., a Notes user in the early stages of making a commitment to Lotus' SmartSuite offering, which currently includes the 1-2-3 spreadsheet, the Ami Pro word processor, the Freelance Graphics presentation package, the Organizer personal information manager and CC:Mail client software.

"We'd like to see them put Notes in a suite to simplify billing," said Stephen Michael, senior director of information systems.

Once the integration of Notes and SmartSuite takes place, Lotus is expected to develop a document management system that will leverage the groupware capabilities of Notes, said Brownell Chalstrom, president of Chalstrom Consulting in Oakland, Calif.

"With mail and other workgroup applications, suites will be moving from loosely glued to supergined applications," Chalstrom said.

Close behind

But while Lotus enjoys an edge over its rivals in terms of application integration, Microsoft Corp. and Borland International, Inc. are expected to offer significant application integration enhancements later this year [CW, May 31].

And Lotus' short-term integration lead may not be enough for it to overcome Microsoft's substantial lead in the Windows software market.

"If somebody bought off on all the Lotus software, it makes sense to buy a suite with Notes. But there's an awful lot of people out there with Excel spreadsheets so I don't think the Lotus move will have a major effect," said Norman Weizer, president of Weizer Associates, Inc., a consultancy in Lexington, Mass.

BeyondMail to add routing, tracking to E-mail package

By Lynda Radosevich
CAMBRIDGE, MASS.

Beyond, Inc. will announce this week an updated version of its electronic-mail software that adds templates for routing mail around an office, support for sending document images in mail messages and the ability to connect to a database back end.

Available in the third quarter, BeyondMail 2.0 is aimed at the same advanced set of local-area network E-mail users targeted by Lotus Development Corp.'s Notes, said David Whitten, a program director at Gartner Group, Inc. in Stamford, Conn.

"The software includes a serial routing application that lets users select a sequence of recipients and assign due dates to each. The originator can track the progress of the message as it is routed.

Additionally, BeyondMail 2.0 comes with Watermark Software, Inc.'s image processing software. The software uses Microsoft Corp.'s Object Linking and Embedding technology to "point" to an image generated by scanners and in-bound fax gateways and stored on a file server. Users can embed a miniature document image in a mail message and click on the miniature to call up the image for annotation. The message can be stored in one place and "pointed to" rather than copied into the message, which saves disk space, a Beyond spokesperson said.

Maj. Jack Stackhouse, a chief systems engineer at the Materiel Systems Center at Wright-Patterson Air Force Base in Ohio, is testing several packages including BeyondMail to automatically route forms and send data across Novell, Inc. NetWare networks to remote Oracle Corp. databases. Additionally, the base wants to scan documents and store them in an optical jukebox, and then access and distribute the documents electronically.

"Our idea always has been to use E-mail as the transport" for data queries, Stackhouse said.

He added that he is looking at software from Wang Laboratories, Inc., Novell/Eastman Kodak Co. and Delrina Corp. but likes that Beyond handles imaging and work flow into the E-mail software.

"It means I wouldn't have to buy additional licenses," he said.

BeyondMail 2.0 uses NetWare's Global Message Handling Service messaging backbone and will synchronize with the NetWare 4.0 directory service. It runs on DOS- or Microsoft Windows-based PCs and costs $695 for a 10-user license.

Test to ship

Beyond plans to send Apple Computer, Inc. Macintosh and Unix versions of its E-mail software to customer test sites by the end of the year and estimates a first-quarter 1994 ship date.

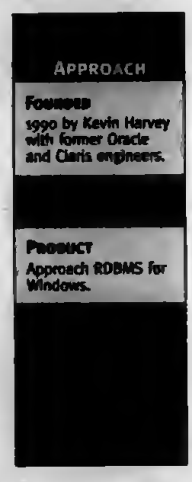
Acquisitions

Database firm adds depth to Lotus lineup

By Michael Vizard
CAMBRIDGE, MASS.

■ Lotus Development Corp. last week acknowledged its plans to acquire Approach Software Corp. in Redwood City, Calif., in a $20 million move that is expected to further complicate an already fractious Microsoft Corp. Windows relational database field.

For Lotus, the acquisition fills a long-standing hole in its overall product line that in recent months has been exploited by both Microsoft and Borland International, Inc. Similarly, Approach needed a white knight to fend off the marketing muscle of Microsoft and Boriand as well as smaller rivals such as Software Publishing Corp.



Following the acquisition, Lotus' first priority will be to revamp the Approach database during the coming year by building in SmartIcons and tightening integration with Lotus' SmartSuite offering [CW, May 24].

Approach is a simple-to-learn, easy-to-use database similar to what a 1-2-3 spreadsheet user would want to use, said Rich Finkelstein, president of Performance Computing, Inc., a consultancy in Chicago.

The inclusion of Approach in SmartSuite will be part of a Lotus effort to distinguish Approach as an end-user database for what Lotus Chief Executive Officer Jim Manzi called "normal people."

In contrast, Manzi said the databases that Boriand and Microsoft have recently opted to package in their suites are really programmer's tools ill-suited for end users. "The acquisition is aimed squarely at the suite market," Manzi said.

"A big piece missing all along in SmartSuite has been a database, especially now that Microsoft has a database in Microsoft Office," said Colin MacKenzie, a local-area network administrator at New England Telephone Co. in Framingham, Mass.

According to MacKenzie, persuading his management to adopt SmartSuite has been a challenge because it would have required the purchase of a database from another vendor.

Meanwhile, Approach users are looking forward to the resources Lotus will bring to the equation.

"The resources Approach will have in terms of engineering and marketing will be tremendous now," said Thomas Bullerman, loss control manager at the property and casualty division of Cigna Co. in Milwaukee.

In addition to being a relatively simple database, Approach also provides a tool for downloading data from databases made by Oracle Corp., Microsoft, Boriand and IBM via a set of predefined Powerkeys.

Microsoft has been particularly successful at depicting Access as a front-end query tool for high-end databases, such as Oracle's offering, that can be easily adopted by end users while also giving programmers the tools to build applications.

"If I don't need sophisticated logic, then Approach is a fine thing," Finkelstein said. "But Microsoft and Lotus can claim they do both the simple and complex. There's no way Lotus can claim to do the complex with Approach."

Thus far, Microsoft claims to have already shipped close to 900,000 units of Access worldwide.

"Access is somewhere in between an end user-tool and a programmer's tool. Access can extend up while Approach is only an end-user tool. Corporate accounts want a single database standard that they can give to both users and developers," said Mary Engstrom, a Microsoft group product manager for Access.

"Corporations don't want to support two different database standards, and they don't want to deploy something that's going to run out of power," added David Watkins, vice president of product management at Boriand.

But Lotus maintains that Approach was designed to write and read to the formats of a number of back-end databases so IS managers do not have to support another database format.

"We don't really need a programming language. The most complicated thing we need is the ability to move data within the database," MacKenzie said.

8 of the top 10 'For ies are using Oracle7.

Here's what our custom about Oracle7:

"It's the driving force behind our most sophisticated applications."
"You can't break it, it just keeps running and running."
"It's the best Client/Server solution out there."
"We needed a truly open solution: Oracle7 is it."

To find out more about why companies of all sizes are choosing Oracle7, c
We'll send you in-depth analysis from IDC and Aberdeen, and you'll see f
yourself why everyone is so excited. 1-800-633-1071 Ext.8120

ORACLE

©1993 Oracle Corporation. Fortune is a trademark of Time Inc.

News Shorts

Storage Tek sues EMC over patent

Storage Technology Corp. has filed a patent infringement lawsuit against **EMC Corp.** in Hopkinton, Mass., alleging that EMC's Symmetrix product line impinges on Storage Tek's caching technology. EMC disputed the claim, saying in a statement that the suit was a surprise, especially because Storage Tek has "not been able to successfully develop a single product based on their caching technology."

Banyan directory works with NetWare

Banyan Systems, Inc. in Westboro, Mass., is expected to announce this week a new version of its Enterprise Network Services for **Novell, Inc.**'s NetWare network operating system. The product, which provides Banyan's StreetTalk directory and security services for NetWare users, has been enhanced to allow users of Banyan's Vines network operating systems and users of NetWare to exchange files.

More carrier legal battles

AT&T last week filed a complaint in U.S. District Court against **MCI Communications Corp.** for not complying with a stipulation in the Communications Act of 1934 that requires all common carriers to file tariffs for interstate services. AT&T named Bank of America, Chrysler Corp., Citibank NA, Kmart Corp., Caesar's World, Gateway 2000, Inc. and Compaq Computer Corp. as MCI long-distance customers being charged rates different from those on file at the FCC.

Sybase distributes database server

Sybase, Inc. formally unveiled Replication Server, a product under Sybase's System 10 rubric designed for distributed database computing. Priced between $16,500 and $43,650, Replication Server targets large users that want to synchronize continuously updated data in different geographic locations. Replication Servers for Sun Microsystems, Inc. Scalable Processor Architecture-based and IBM RISC System/6000 machines are due out in the fourth quarter.

Seeing the forest and the trees

Weyerhaeuser Co., a Tacoma, Wash., forest products company, said last week it would build its next generation of systems on **Hewlett-Packard Co.** HP 9000 Unix servers and workstations. The $9.2 billion firm plans to downsize some of its mainframe applications and build new client/server applications throughout its enterprise. Weyerhaeuser plans to spend $25 million on HP systems in the next few years.

Compaq execs sell stock

Seven Compaq executives, including its chairman, Ben Rosen, sold stock in the company last month, according to documents filed with the Securities and Exchange Commission. The trades drew attention partly because Rosen has never sold shares in Compaq before and partly because Compaq's stock has slipped in the last two weeks, after hitting a 52-week high. Rosen sold 83,000 shares, approximately one-sixth of his holdings, and gave another 17,000 to charitable causes. The other executives cashed in slightly more than 300,000 shares, mostly by executing options.

SHORT TAKES The **IBM Consulting Group** has launched the **IBM Multimedia Consulting Practice**, a worldwide organization whose charter is to define, analyze and recommend multimedia technologies for customers.... **HP** said it will announce today two fixed-configuration, aggressively priced local routers and will slash prices on much of its internetworking line by 16% to 24%.

News shorts, *page 16*

Network to save $40M/year

By Nell Margolis

Four of California's major health insurers last week banded together with Electronic Data Systems Corp. and health care network specialist Health Information Technologies (HIT) to launch a payment network expected to cut some $40 million a year in administrative costs.

Conceived by health maintenance organizations (HMO) TakeCare in Concord and HealthNet in Woodland Hills, the alliance also includes San Francisco-based Blue Shield of California and Woodland Hills-based PruCare of California.

EDS will implement the network — known as California Health Information Network — and HIT will provide the technology. While precise technological details have not yet been mapped out, according to executives from several of the firms involved, a key ingredient of the plan is that HIT will serve as a technological clearinghouse. To some extent, payors that join the network will not have to throw out their current technology.

The California Four hope to complete the first implementation of their joint venture to electronically determine eligibility and process claims this fall, said Mark Rose, general manager of information systems at PruCare.

While no official pilot has begun, a mini beta test is already under way at Los Angeles-based Cedars-Sinai Physicians' Association, a so-called independent physician association through which some 200 doctors serve approximately 50,000 patients at 15 HMOs.

The association has already installed claims-paying software from Woodland Hills-based software designer Fred Rothenberg & Associates, but the doctors who belong to the association are unable to access it. The software vendor hired HIT to help bring the doctors into the electronic loop.

The three-way link project is slated to come out of beta testing next month, said Fred Rothenberg, president of the firm.

Electronic need

Even before they have finished working out the details of their game plan, however, IS managers and executives from several of the health care payor organizations attested to the urgent need for electronic communications between health care payors and providers.

For starters, waste is inherent in the current, paper-logged system. Estimates of the savings potential in multiplayer electronic data interchange (EDI) range from $4 billion to $10 billion, according to the Workgroup for Electronic Data Interchange.

In addition, noted Brad DeMaso, provider IS systems administrator at TakeCare, the alliance marks an effort to read some true meaning into the word "standards" when it comes to EDI. "As it is," he said, "there are too many standards; it's just too complicated." The alliance, he said, offers a chance to "really standardize on a 'one black box' solution."

The black box in this case will be HIT's managed care specialized network, which currently processes about 200,000 claims and eligibility transactions a month using a Stratus Computer, Inc. XA 2000 Series 200 host.

The HIT network currently connects some 100 insurers with about 1,500 doctors' offices. The latter figure could be due for a boom: The four California Health Information Network allies represent a combined statewide membership of approximately 3.5 million subscribers.

Tandem to deliver Posix OS, RISC-based Cyclone

By Jean S. Bozman
CUPERTINO, CALIF.

Tandem Computers, Inc. is planning to update its line of fault-tolerant computers with a Posix-compliant version of its proprietary operating system and a reduced instruction set computing (RISC)-based version of the high-end Cyclone machine by year's end, company executives said last week.

Tandy's James Treybig: *'RISC move is critical for growth'*

The changes will reposition Tandem's flagship Guardian line as a more open system with greatly improved price/performance, said James Treybig, chief executive officer. Moving to RISC technology from complex instruction set computing processors in high-end Cyclone machines will also enable $2-billion Tandem to bring manufacturing costs in line.

"The movement of RISC into Cyclone brings our price down so we can be competitive across the board with no deterioration in margins," Treybig said. "This is critical for growth."

Tandem's last major hardware announcement — CLX/R and Cyclone/R machines based on RISC chips made by Silicon Graphics, Inc. — was made in the fall of 1991.

The company's new kernel for its Guardian operating system will support standards, such as Posix, in an effort to make applications written for Tandem systems more portable. Tandem also intends to support the Open Software Foundation's Distributed Computing Environment and Microsoft Corp.'s Open Database Connectivity, Treybig said.

Gary Sabo, director of product marketing for Tandem's Open Access Computing Group, said the new operating system and the RISC-based Cyclone would be introduced by year's end. "We are committed to delivering a Posix-compliant operating system by the end of the calendar year," Sabo said. But first, Tandem will deliver a Posix tool kit to users.

Tandem said it had briefed some of its users about the impending hardware and software changes. But Philip Newbold, vice president and information services director at Kaiser Permanente of Northern California in Walnut Creek, one of Tandem's biggest sites, said he had few details. Posix compliance will not change Kaiser's mainline Cyclone-based processing of hospital records, he said.

Other sites may find more use for Posix, industry analysts said.

Some analysts said the move toward a more open version of Guardian was long overdue. "They're reworking the Guardian operating system to do what IBM and DEC have already done, which is to provide Posix compliance," said Omri Serlin, president of ITOM International Co. in Los Altos, Calif., which tracks fault-tolerant systems. "It won't entail additional overhead, so it will be as efficient as running native Guardian code."

Automated data transfer can have a major impact on the productivity of your workforce.

If your business depends on distributed business applications, then you have all the right reasons to explore automated data transfer. It's not just moving data. It's being certain that related processing is automatically initiated when the data gets there. And making sure it's all completed without consuming valuable resources — equipment or people.

With Network DataMover® you get dramatic improvements in productivity and connectivity. You can automate and schedule procedures, provide exception notification, and transport data seamlessly over native communication protocols to multiple platforms including your PCs, UNIX® machines, and a nearly unlimited variety of host systems. In short, save time. And get more done.

You won't go it alone, either. Network DataMover experts on every platform are committed to helping you plan and achieve a successful implementation. So next time you're asked to do more in less time using fewer resources, call us. Because when it comes to improving productivity across the board, Network DataMover carries a lot of weight.

SYSTEMS CENTER®

WASHINGTON • TORONTO • LONDON • BRUSSELS • PARIS
FRANKFURT • TOKYO • SYDNEY • SINGAPORE • SAO PAULO

© 1992 Systems Center, Inc. Network DataMover is a registered trademark of Systems Center, Inc. and its subsidiaries. UNIX is a registered trademark of UNIX System Laboratories, Inc.

USL makes microkernel move

Users will be able to host NetWare under System V Release 4

By Jean S. Bozman
SAN FRANCISCO

On the eve of Novell, Inc.'s acquisition of Unix System Laboratories, Inc., USL said it is moving its System V Release 4.2 operating system to a microkernel architecture.

The microkernel version, due to be officially announced this week, will allow Unix and Novell's NetWare network operating system to work well together, USL said. The microkernel version will allow users to host NetWare applications under the System V Release 4 operating system, analysts said.

USL's Michael DeFazio: *Estimates shipping to users in '94*

Users will be able to customize their operating environments by adding many such "personalities" to the basic microkernel for distributed applications (see chart). Michael DeFazio, executive vice president of USL, which is based in Summit, N.J., said these personalities would support applications written for NetWare, Microsoft Corp.'s DOS and Windows and the Apple Computer, Inc. Macintosh.

Users should gain indirect benefits from enhanced computer systems running System V Release 4. "A microkernel is much easier to maintain over the long haul because it's modular," said Julie Rodwin, a Unix analyst at Computer Intelligence/InfoCorp in Acton, Mass. That will make it easier for systems vendors to revise their implementations of System V Release 4, she said.

The microkernel is based on technology from Chorus Systems, Inc. in Beaverton, Ore. it provides a step on the way to delivering an object-oriented version of Unix in the late 1990s. The microkernel architecture's modular nature will lend itself to object-oriented programming that encapsulates system elements for use in distributed applications.

Aiding integration

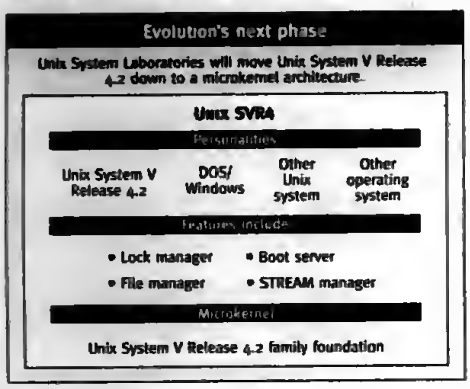
Industry analysts said the operating system evolution would aid the integration of Novell and USL software. "It is quite likely that the engineers at Novell and USL are struggling to merge two highly different operating system cores," said Peter Kastner, a vice president at Aberdeen Group in Boston. "A microkernel approach may in fact allow a lot of differences to be papered over."

USL will sell the microkernel operating system directly to systems vendors such as Unisys Corp. and Cray Research, Inc., which will optimize it for their hardware. Systems vendors and information systems directors will have the option of customizing System V Release 4 by tacking on additional services, such as support for single-system image, real-time functionality and fault tolerance.

The timing of the microkernel's release to the user community — which could be a year or more away — is unclear. "It's a phased rollout from the start," DeFazio said. "My estimate is that our OEMs will begin shipping product to users in calendar 1994." Others will follow in 1995, analysts said.

Meanwhile, DeFazio said, users can keep writing applications for System V Release 4.2 and Release 4.2MP for multiprocessors with the expectation that they will run under the microkernel version.

USL is building on several years of research conducted jointly by Unisys Corp. and Chorus, Kastner said. He also noted that System V Release 4.2 will compete with Microsoft's Windows NT, which is based on microkernel technology. Next, Inc.'s NextStep and upcoming versions of OS/2 are built on the Mach microkernel.



IBM, HP to become object-oriented allies

By Melinda-Carol Ballou
SAN FRANCISCO

■ IBM will line up additional support for its object-oriented strategy with the announcement this week of a technology alliance with Hewlett-Packard Co.

HP is expected to license portions of IBM's System Object Management (SOM) technology, an object-oriented framework for defining and managing binary class libraries and building distributed applications. IBM, meanwhile, will license portions of HP's Distributed Object Management Facility (DOMF) to let developers create applications that are interoperable, industry sources said.

IBM will also announce a developer's tool kit for SOM and distributed SOM (DSOM) this week. It will incorporate key services of HP's DOMF and ship by the third quarter, the sources said.

In addition, IBM is working with Apple Computer, Inc. to jointly deliver object technology based around DSOM later this year via its Taligent partnership. Discussions with others such as Sun Microsystems, Inc. are also under way, according to industry sources.

"If IBM is working with HP, Sun won't be far behind," said John Rymer, an analyst at Patricia Seybold's Office Computing Group, a Boston consulting firm. "This opens the floodgates a little bit to allow [Object Request Brokers] to communicate across platforms."

"It's everyone against Microsoft once again," said Liz Barnett, a vice president at New Science Associates, Inc., a consulting firm in Westport, Conn.

Cliff Reeves, manager of object technology products for IBM's Personal Software Products Division, focused instead on the benefits that standards will offer to developers of object-oriented applications. DSOM and SOM support the Object Management Group's (OMG) Common Object Request Broker Architecture (Corba) and use its Interface Definition Language to perform language mappings.

Triple layers

SOM, DSOM and DOMF will put layers in place to support distributed object computing for Taligent, IBM and Apple's next-generation object-oriented operating system.

"The goal of introducing SOM and of working with partners is to start putting a viable, nonintrusive standard in place that links islands of object technology," Reeves said. Microsoft Corp. has just started shipping Object Linking and Embedding 2.0 (OLE) — which is available only on its Windows operating platform. it will be widely adopted by third-party desktop developers and will eventually run on DOS and the Apple Macintosh.

But analysts said that while Corba and DSOM offer a framework for distributed object computing, OLE 2.0 merely provides a linking service for objects and is considered an interim step to Microsoft's next-generation Cairo environment.

"I don't think it's apt to compare them; there's no distribution of objects in OLE 2.0," Rymer said. "OMG is starting by defining infrastructure, and Microsoft is starting from the desktop and building the infrastructure as they go along."

While the OMG and its proponents seek to win out by supporting robust, distributed environments well before Microsoft does, the advanced technology alone is unlikely to succeed, according to Rymer.

"Microsoft clearly is not a front runner with this technology, yet it may not matter. To have distributed object computing is a remarkable accomplishment, but it must be accessible and cost-effective, or it may go the way of other marvelous technologies that were not packaged correctly," Rymer said. "They have to give people a reason to move in this direction rather than waiting for Microsoft."

At your service

The Object Management Group (OMG), the consortium working to build object-oriented standards, is scheduled to announce this week at Object World four low-level services for its Common Object Request Broker Architecture (Corba).

These services include events, naming, persistence and life-cycle services to help standardize the storage and retrieval of objects. They are the result of input from 18 vendors, including IBM, Hewlett-Packard Co., Digital Equipment Corp., Oracle Corp. and Sun Microsystems, Inc.

The current services come primarily from technology developed by Sun called Joint Object Services, behind which the other companies are uniting to meet the OMG's Request for Information, industry sources said.

The OMG is seeking to address low-level services initially and will put out a Request for Technology for others next month, including transaction services.

The more politically complicated, higher level services, such as linking and embedding (addressed by Microsoft's OLE and other technologies) will be tackled later on, OMG President Chris Stone said.

Interoperability is the goal of Corba 2.0, which is expected to ship during the first quarter of 1994.

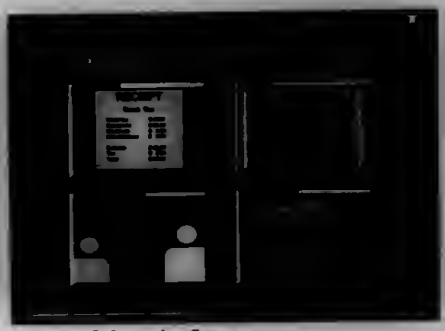
Microsoft has not yet come on board in support of Corba, although it is a member of the OMG.

Stone said the organization is engaging "high-level executives" at Microsoft in discussions, but it will take time, nurturing and customer pressure to bring the company on board.

— Melinda-Carol Ballou

Financial Planning

Econometric and Time Series Analysis



Executive Information Systems

Quality Improvement

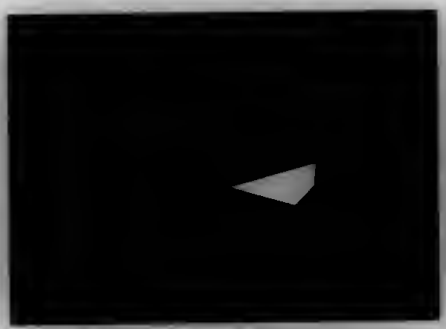
The SAS® System. The World's Leading Information Delivery System.

Computer Performance Evaluation

SAS Institute Inc.
Software Sales Division
SAS Campus Drive ☐ Cary, NC 27513
Phone 919-677-8200 ☐ Fax 919-677-8123

SAS is a registered trademark of SAS Institute Inc.
Copyright © 1992 by SAS Institute Inc. Printed in the USA.

Reporting



Market Research

Business Graphs

Visualization

Data Analysis

Project Management

Scheduling, calendaring top E-mail agenda

By Michael Vizard and Lynda Radosevich

As information systems managers get a handle on PC-based electronic-mail systems, many organizations are launching their first mail-enabled applications, with group-scheduling packages leading the charge.

To service this market, the major PC software suppliers are moving to provide cross-platform scheduling packages that will allow Microsoft Corp. Windows, DOS, Apple Computer, Inc. Macintosh and Unix users to schedule meetings across a variety of E-mail transports.

For example, Microsoft will announce at the Electronic Mail Association's annual conference this week that it will create DOS client software that will be tied into Microsoft's Schedule+ for Windows and Macintosh with the aid of Powercore, Inc. in Manteno, Ill.

And the MHS Alliance, a messaging consortium led by Novell, Inc., is spearheading an effort to create a standard application programming interface (API) for calendaring and scheduling applications to enable interoperability among various vendors' software.

Included in the effort are Powercore, Microsystems Software, Inc. and Campbell Services, Inc., whose packages make up 98% of the market for local-area network calendaring and scheduling software, according to MHS Alliance President John Rizzi.

An important component of the MHS Alliance strategy is getting the LAN systems to talk to IBM's Professional Office System (Profs) office automation environment, Rizzi said. To that end, the group is working with terminal emulation vendor Attachmate Corp. to provide an API that will span the LAN and mainframe environments.

In general, group-scheduling software is not expected to be widely adopted until the major software providers can supply a single approach that can be shared by users on different platforms across an organization, noted Matt Cain, program director for workgroup computing at Meta Group, Inc. in Westport, Conn.

For example, the Oregon State Treasury in Salem wants to migrate calendaring and scheduling functions off a Wang Laboratories, Inc. VS platform but must find a package that works with the Wang system and across Macintoshes and Windows PCs, said Joe King, network analyst.

All in the family

Meanwhile, vendors are trying to meet users' cross-platform needs within their own products. For example, WordPerfect Corp. in Orem, Utah, this month began shipping WordPerfect Office 4.0, which includes E-mail and a group-scheduling facility on Windows, Macintosh and DOS platforms [CW, May 17].

Powercore is delivering Windows and DOS versions of its Network Scheduler 3 software, with a Macintosh implementation set for year-end delivery.

At the same time, Lotus Development Corp. has been reselling Powercore software during the past two years but in recent months has outlined a separate group-scheduling initiative based on its Organizer for Windows software.

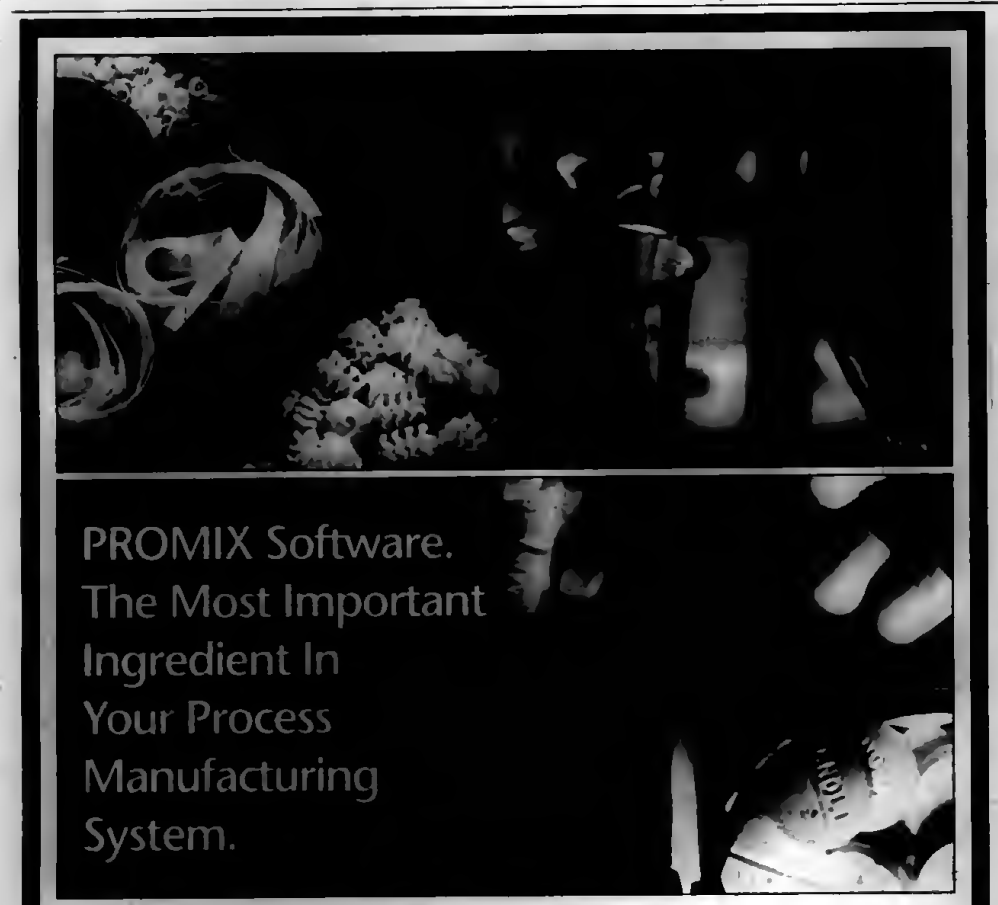
Organizer, which includes a personal information manager and scheduling facility that will be tied into Notes and other Lotus applications, will be ported to Macintosh and DOS platforms later this year.

Despite the lack of availability of group-scheduling software on every major platform, interest in it remains high.

However, Craig Goldman, chief information officer at Chase Manhattan Bank NA, noted that while group-scheduling packages have become a checklist item on purchase orders, instilling discipline in the average user to make use of such packages remains the greater challenge.

And while software vendors are racing to build up installed bases for their scheduling software, Cain said these packages will eventually be standard in robust E-mail packages.

Using Profs, which includes calendaring software, as a model, Cain said in the long term, he does not expect E-mail providers will be able to charge "a premium" for group-scheduling packages.



With increasing needs for automation and integration, process manufacturers find themselves with handfuls of incompatible applications that address only one part of the process. They don't have an integrated information solution that pays attention to the whole process.

Well, now, PROMIX™ process manufacturing software puts just the kind of control you ought to have, just where you ought to have it. In your hands.

Because PROMIX is a fully integrated series of process manufacturing applications that give you a single, fully-integrated, enterprise-wide management system.

So your integrated quality management information is available for review during every step of the process. You can do finite scheduling based on easily available information from different points in the procedure. You can manage your facility through completely integrated scheduling and control the warehouse so that the right materials are delivered where and when they're needed. And costs are reflected during the process in real time.

It's such a simple concept that, frankly, we're surprised that nobody else did it before. Integrate everything with everything else in the process. Fortunately for us, nobody else did. Fortunately for you, we noticed. And moved to fill the gap. So now PROMIX makes everything you need available in a common format.

When you add to that our completely integrated financial applications, you can give yourself complete information for total control. From raw materials to profit and loss statements.

To make PROMIX an integral part of your process, call Ross Systems. It's one important ingredient you don't want to leave out of the mix.

ROSS SYSTEMS
An Integral Part Of The Process

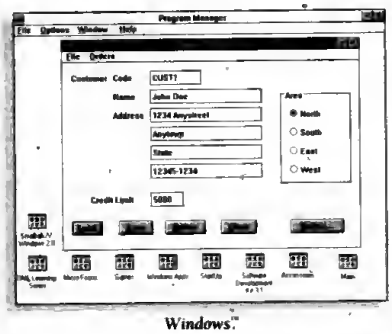
Ross Systems Inc. 555 Twin Dolphin Drive, Redwood City, California 94065 Phone 404.851.1872 Ext. 2400

Rightsizing options today, that will remain open tomorrow.

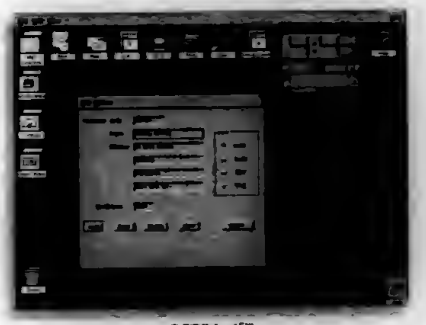
If you're trying to forecast what your company's computing environment will be like a few years from now, you can be certain of two things:

One is that you will probably be moving your business applications to another industry-standard platform. And the other is that you will be able to deliver them with the **Micro Focus Rightsizing** and **Cross-Platform Solution**. Portability is inherent in our products, with the future already built in.

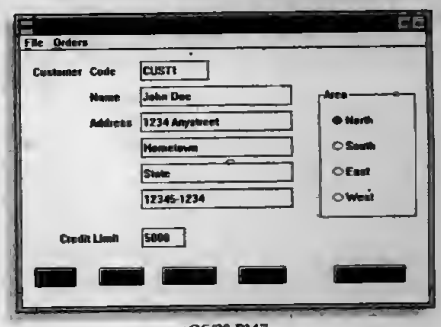
the interoperability to take advantage of the latest hardware and software, plus the tools to enhance productivity, speed development and deliver quality



Windows.™



OSF/Motif.™



OS/2® PM.™

Three operating systems. One application. Now you really can develop it once and for all.

With the Cross-Platform Solution your applications can run on today's major platforms, including DOS, Windows, OS/2, Windows NT,™ UNIX,® Motif and even host-based systems.

Whatever the standards are tomorrow, you'll have the ability to mix platforms and operating systems, applications that will keep your company on the leading edge. No matter what the future brings.

For more information on the **Micro Focus Rightsizing and Cross-Platform Solution**, call **800-872-6265**. Discover how Micro Focus delivers ***"A Better Way of Programming."™***

MICRO FOCUS®

Micro Focus, Inc., 2465 East Bayshore Road, Palo Alto, CA 94303 Tel. (415) 856 4161

Micro Focus is a registered trademark and "A Better Way of Programming" is a trademark of Micro Focus, Inc. All other tradepurks are property of their respective companies.

GSA Contract Number GS00K90AGS5251-PS02

Low PC tags have their price

CONTINUED FROM PAGE 1

Dell Computer Corp., and "they may pick the phone up quick but can put you on hold for ages."

Kicking off this cycle was Compaq's June 1992 announcement of its price-conscious Prolinea line, which was followed four months later by IBM PC Co.'s Personal System/ValuePoint release, a one-two punch that shook double-digit growth out of a supposedly mature PC market.

The aftermath felled some competitors, but Compaq has seen its U.S. market share more than double to 10% so far this year, and IBM has reversed long-term market share declines, holding at roughly 13%, according to International Data Corp. (IDC) in Framingham, Mass.

"Compaq collapsing the price umbrella and Intel dropping chip prices 60% were the two most significant events of '92 [in PC hardware]," said Bruce Stephen, IDC's director of PC hardware and pricing research.

> "It's going to be a long, hot summer; we'll see who's around in the fall."
>
> —*Michael Coleman, IBM PC Co.*

Back in front

Analysts credited Compaq with re-establishing itself as the pacesetter in the hardware industry.

Meanwhile, most vendors have tried to beef up service and support in the face of three-year warranties from Compaq and IBM; all competitors have added features to hold up prices.

Vendors now have to go beyond hardware to provide "the total package: software, service and support," said Michael Coleman, IBM PC Co.'s vice president of marketing and brand management.

Ted Waitt, Gateway 2000, Inc.'s "head hog at the trough," said Gateway actually raised prices in the face of Compaq's initial product moves to reflect added features. He acknowledged that the Big Two's charge caused Gateway, which generates 97% of its sales in the U.S., to delay a planned 1992 expansion into Europe while it addressed its service weakness here.

Still, the North Sioux City, S.D., mail-order vendor has seen its sales to corporate and institutional users grow from 33% of total sales in 1991 to between 45% and 55% of total sales today.

Gateway may have benefited from IBM's and Compaq's pell-mell channel expansion, which saw both companies, among others, enter the mail-order market.

As users shifted to Intel Corp. 1486-based systems, huge demand swamped many vendors — IBM, Compaq and Apple Computer, Inc. in particular — and backlogs remain lengthy, resellers and users said.

Apple, bushwhacked by lower prices on Microsoft Corp. Windows-based PCs, has seen profits slide (see story at right).

Boon to some

The backlog cloud seems to have a silver lining: Compaq and IBM's onslaught has fallen short of forcing massive numbers of smaller PC makers out of the business.

In fact, while Tandy Corp., Everex Systems, Inc. and some smaller companies have left the business or been forced to restructure, sometimes under bankruptcy protection, other companies have actually gained sales because their bigger brethren cannot meet demand.

"I've thought many times about sending a thank you note to [Compaq Chief Executive Officer] Eckhard Pfeiffer," said Robert Frankenberg, vice president and general manager of Hewlett-Packard Co.'s personal information products group.

Frankenberg's group has experienced triple-digit growth thanks to its renewed effort in the PC market and Compaq's inability to meet demand, he said.

Clouds on horizon?

The generally lower margins in the hardware industry worry some users, who said an R&D drop-off "has the potential to be a problem, but the big vendors are the ones who will survive, and they're the ones who are still [doing the research]," said Stephen Ades, director of IS at States Nitewear, Inc. in New Bedford, Mass.

"The other guys just clone them."

There will probably be fewer of those "other guys" by year's end, according to analysts and industry figures. They predicted continued industry consolidation, particularly if the current growth binge flattens out.

"It's going to be a long, hot summer; we'll see who's around in the fall," Coleman said.

Weak quarter may reduce Mac prices

By James Daly

CUPERTINO, CALIF.

As if engaged in a long game of limbo, Apple Computer, Inc. executives charged with the task of deciding Macintosh prices these days must be asking themselves, "How low can they go?"

Last week, Chairman John Sculley announced that the company faces disappointing earnings in the second half and as a result will take "aggressive action to accelerate sales momentum for our Macintosh products." An Apple spokesman said that will translate into Macintosh price cuts, and a rebate program will begin today.

Eugene Glazer, an analyst at Dean Witter in New York, said the price cuts are needed to stimulate demand. While Apple's unit shipments rose in the first half, earlier price cutting significantly slimmed Apple's once average 40% profit margins.

Yet today the Macintosh still costs more than similarly configured IBM PC-compatible clones running Windows. For example, Apple's recently introduced PowerBook 185C costs $4,759, while a similar model from Toshiba Corp. sells for around $4,100.

But there are signs that may be changing. Last month, Apple cut some computer prices 16% and some printers 29%.

Observers speculated that Apple will lay off workers as part of its cost-cutting program. It cut 1,500 positions and chopped salaries in 1991 when profit margins slid.

Customer clout

"The fundamental reason Compaq changed was their corporate customers repeatedly hit them in the head with sledgehammers," said Bruce Stephen, analyst at IDC.

Backlogs no longer exception

By Michael Fitzgerald

Reports that some backlogs in the PC industry are easing have many corporate users wondering when things will improve for them, especially because at least one major vendor insists that backlogs are a "fact of life."

Supply "is an absolute nightmare for us," said W. B. Lovan, assistant buyer of indirect materials at Caterpillar, Inc. in Peoria, Ill. "The old IBM announced products, then made you wait three to four months to get them. Tell me what's different today?"

Lovan said that in the wake of the IBM PC Co.'s inability to meet demand, several groups within Caterpillar have opted to buy from suppliers such as Digital Equipment Corp.

Michael Coleman, IBM PC Co.'s vice president of marketing and brand management, said, "We continue to ship more and more units every month. In fact, we have passed our expectations in terms of what we have shipped." Coleman did not say when IBM might catch up with its backlogs, which are even worse on its ThinkPad notebook lines than on its desktop products.

At Compaq Computer Corp., possibly the worst backlog offender, the vendor is sending systems out the door in record numbers, but its supply picture continues to look bleak.

Resellers acknowledged that they get more units from IBM and Compaq than in the past. However, John Howman, president of Allied Computer Group, Inc., a Milwaukee systems integrator affiliated with Inacom Corp., said, "They're making products in record numbers and distributing them through record numbers of channels." Howman said his backlogs were $1 million higher this year than last.

There may be no relief in sight.

"I think backlogs are a fact of life," said Ross A. Cooley, Compaq's senior vice president, North America. Cooley said short product life cycles mean "the majors will always have something constrained. We want to be able to say there's a minimal amount of unconstrained product."

Kimball Brown, an analyst at Computer Intelligence/Infocorp in Santa Clara, Calif., said short product life spans and shrinking profit margins make backlogs advantageous for vendors.

"Essentially, [vendors] want these big backlogs because [it lets them] transition from product cycle to product cycle profitably" without having to write off inventory, Brown said.

Matt Fitzsimmons, a Computerland Corp. dealer in White Plains, N.Y., who has decried the backlog situation, conceded that point. "At the rapidity with which [vendors] are introducing new products, it's healthy from a manufacturer's point of view to always have a backlog." Fitzsimmons said he fears that backlogs will indeed become the status quo.

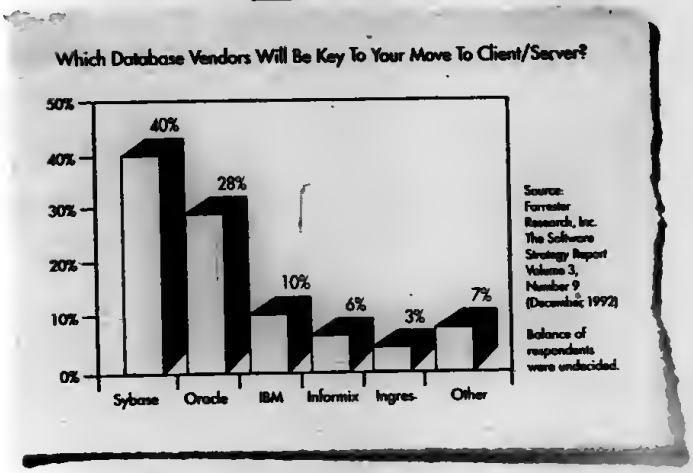
Brown, though, said it was not clear yet just how endemic backlogs are. He said that if Compaq is the only vendor that runs a backlog, it will backfire.

In the meantime, the backlog has created some strange scenarios. "We get customers asking us to buy their hardware for them [from another reseller] when we can't get it. It's a bizarre trend, but reality is if you talk to high-volume IBM/Compaq dealers, they source product from wherever it is," Howman said.

Monkeying around

The monkey is on Ross Cooley's back, which means Compaq has scored at least one victory against its massive backlogs. Cooley and Jim Hartzog, vice president of the PC division's product development, trade a 6-in. tall plastic gorilla back and forth, based on whether sales is ahead of manufacturing. About two weeks ago, Compaq caught up with DeskPro/M and DeskPro/I demand for the first time in roughly a year, and Hartzog handed the toy to Cooley.

The analysts have graphed the future of Client/Server computing.



And they have also spoken.

In recent issues of their ongoing reports, four of the most respected computer industry analysts have taken an unbiased look at Sybase, and its vision of enterprise-wide client/server computing.

They were impressed.

SYBASE®

For copies of the full reports from Forrester Research™, Gartner Group, Meta Group and New Science Associates, please call 1-800-8-SYBASE.

© Sybase, Inc. 1993 All rights reserved SYBASE and the Sybase logo are registered trademarks of Sybase, Inc Forrester Research is a trademark of Forrester Research, Inc.

Palmer vows to fire up DEC sales force

By Craig Stedman
ATLANTA

■ Digital Equipment Corp. plans to bring its top 800 sales and marketing managers together for three days starting July 7. Given the barrage of complaints DEC executives faced at the Digital Equipment Computer Users Society (DECUS) conference last week about the quality of the company's sales organization, it probably will not be a congratulatory meeting.

Bluntly acknowledging the criticism, DEC Chief Executive Officer Robert Palmer described his sales force as "probably the least productive in the world, fundamentally because they're not well-prepared" — a comment that drew applause from a user audience.

Palmer blamed the sales shortcomings on "a management failure" and said it will "take more than an afternoon" to resolve the problems. "Maybe a year from now, most of this will be fixed."

Frustration abounds

User complaints about sales were not hard to find at DECUS. Verifone, Inc., a Costa Mesa, Calif., maker of credit-card processing machines, got frustrated enough to have its sales representatives removed from the account. "We made a specific point of saying, 'We still want Digital products; we just don't want to deal with Digital sales,' " said David Roberts, an information systems employee at the conference.

Another user said his sales rep sold him a VAX 6000 that would not run his version of the OpenVMS operating system and memory cards that did not fit into his workstations. "You're just falling apart on us," he told a DEC official.

L. Charles Lemond, director of the computer center at Rhodes College in Memphis, had to buy Sun Microsystems, Inc. workstations after being an all-DEC shop in large part because of a weak sales job by DEC. "You have to go down and beat on the door to get them to sell you a computer."

Edward Lucente, DEC's new vice president of worldwide sales and marketing, is scheduled to present his plan for the sales organization at the July meeting in Boston, according to a spokeswoman.

But others said that while responses are slower on noncritical matters and telephone support, major problems are still being handled to their satisfaction. "In the past, they had some marginal people in field service," Lemond said. "All those marginal people are gone now."

DEC climbs aboard COSE

User support, process clarification bring change of heart

By Jean S. Bozman
SAN JOSE, CALIF.

Nearly three months after the Common Open Software Environment (COSE) ship for unified Unix set sail, Digital Equipment Corp. waved the standards-rigged vessel back to the dock and jumped aboard.

At last week's Xhibition '93 show, DEC executives said the company opted for a role in COSE after realizing it had to be a visible part of the unified Unix effort.

Users played a part in DEC's decision to join COSE, particularly those who use DEC's Unix workstations and Ultrix version of Unix.

"We supported the concept [of COSE], but we didn't yet endorse the process," explained Tim Yeaton, group manager of product management for DEC's Unix software group. Users noticing the gap asked about it. "The fact that we hadn't endorsed the [COSE] process made it difficult for our salespeople."

DEC's Tim Yeaton *wanted more info about COSE process*

He said DEC had wavered on COSE because it was asked to join just days before the March 17 announcement. But, after it wrote up a COSE white paper describing the collaborative process through which COSE members will share technology, DEC agreed to join.

That white paper said COSE will simply speed up the current standards process by funneling all final specifications to X/Open Co. in London, a standards body that has large information systems organizations and dozens of vendors as members. DEC's involvement in X/Open and the Object Management Group, a standards consortium, may have pushed it to join COSE, too, some industry analysts said.

Some users at last week's show questioned whether DEC can afford to ally itself with both Microsoft Corp.'s Windows NT and Unix industry groups. But Samuel Fuller, DEC's vice president of research, said it is possible to enthusiastically support both NT and Unix on DEC's Alpha machines.

"From a marketing point of view, DEC would have been better served to say, 'Forget about the details, let's just join,' " Fuller said. "We wanted to see the details of the [COSE] process written down. So we helped them pull it together and write it down. As soon as we got that done, DEC jumped in with both feet."

Some users at large sites agreed with Fuller's view. "They're appealing to an unbelievably wide group [of users]," said David P. Gruhb, a manager of standards and technology assessment at University of California Lawrence Livermore National Laboratory in Livermore, Calif. "They want to ride any horse their customer base might want."

Still, he said, DEC's move may have confused users: "First, the ACE consortium was the way to go, then OSF. Now, they're a part of this [effort], too."

Other users found DEC's move unconvincing. "DEC now has three different operating systems: Unix, VMS and NT," said Michael Podhorodecki, a research and development manager at Labtam Australia Pty. Ltd. in Victoria, Australia. "This doesn't clarify anything."

Compaq end runs makers

CONTINUED FROM PAGE 1

out support and service plans combining its engineers and third-party service vendors in an effort to win the trust of information systems departments that have wide-ranging facilities to service.

"We know that four-hour service in 13 major metropolitan areas is not good enough," Hornstein said.

While "it doesn't make sense for us to add 20,000 people to our service and support organization," he added, Compaq will combine its current support with the third parties "that many of our customers have contracts with already" and establish relationships with software vendors such as Microsoft Corp. to provide effective service.

Users contacted reacted with enthusiasm. "I've been asking for this for 2½ years," said Paul Bandrowski, manager of advanced technology at Sara Lee Corp. in Chicago. "Today, we can cobble together a mainframe-like environment on the PC LAN, but we need something like these machines if we're going to move large-scale, mission-critical applications off the mainframes."

Sara Lee is considering reduced instruction set computing platforms for downsizing tasks but prefers to stay in the NetWare environment on Intel Corp. platforms, Bandrowski said.

Bigger fish to fry

The announcement will also lay the foundation for Compaq's effort to transform itself from a PC box maker into a company that can challenge the likes of IBM and Digital Equipment Corp. It is a strategy the company has discussed previously but has yet to fully implement [CW, May 25, 1992].

Compaq's current behind-the-scenes negotiations with Oracle Corp. and other major software vendors [CW, May 10] are expected to be an important part of the announcement.

Analysts said Compaq has put together an impressive strategy, assuming it can deliver on the pieces.

"I think Compaq could pull this off," said Jeffrey Henning, an analyst at BIS Strategic Decisions in Norwell, Mass.

Compaq has waited to announce products that analysts said have been working well in its labs, Henning said. "They're trying to make sure everything is in place before they announce it."

At the same time, analysts said they doubt Compaq will be able to match its larger competitors in providing service, which Henning called "a serious weakness."

Still, users such as Louis Kahn, chief network administrator at the Centers for Disease Control and Prevention's National Immunization Program, said they like what they hear.

"Chances are I will buy that box as a file server and possibly even as a high-end workstation," Kahn said. "It sounds like Compaq will give me lots of fail-safe stuff built-in and scalability at a price comparable to a DEC Alpha or a Mips box."

Prices listed

Hornstein said Compaq will sell a base model of the new servers, with a 486DX2 33/66-MHz processor, for $5,000, while a Pentium model will sell for $6,000. Top-of-the-line pricing is expected to fall below $25,000.

Included are hot-pluggable internal disk drives, environmental controls that monitor temperature and power use, among other things, and Error Correcting Code, or ECC, random-access memory for higher availability data.

Rollout is scheduled for September, according to sources close to the company. Though Compaq will host 3,000 to 5,000 customers and industry leaders in a conference called Innovate '93 the week of Sept. 13, sources said the company will not introduce the products at that time.

Waiting for assurance

Compaq is delaying support of clustered servers running Oracle's Parallel Server until the database runs solidly on PC servers with The Santa Cruz Operation's SCO Unix, Microsoft's Windows NT and Novell's NetWare, sources close to the company said.

Compaq now intends the Oracle initiative, originally expected to be announced this month with a fall delivery date [CW, May 10], to be a major focus of its fall server announcement.

Compaq refused to comment, although it did acknowledge that software will be an important component of the fall announcement.

— Michael Fitzgerald

IBM to reveal ATM plans

CONTINUED FROM PAGE 1

in an architecture that is at least 18 months away from being an actual product than in current products that can meet their immediate Systems Network Architecture (SNA) internetworking needs.

IBM's future ATM strategy "is definitely interesting to us, but we're not at ATM stage yet. We're quite a few levels behind," said John Gagnon, a technical adviser at Fidelity Investment & Network Service, Inc. in Dallas.

Gagnon's group is just getting into the nitty-gritty of how to integrate SNA and LAN traffic over the same internetworking backbone without seriously hurting SNA users' service levels, he added.

However, IBM's ATM platform, dubbed Broadband Networking Architecture (BNA), will address a far broader population than just SNA users, McGee said. Its Multiprotocol Access Services will map SNA and popular LAN protocols to a new protocol optimized to take advantage of high-speed ATM backbones.

High on IBM's priority list is providing BNA support for NetBIOS and Transmission Control Protocol/Internet Protocol (TCP/IP), as well as Novell, Inc.'s IPX, McGee said. Despite its close ties with Apple Computer, inc., IBM currently has no plans to provide ATM access services for AppleTalk.

IBM plans to work with other vendors on BNA with the goal of making the architecture an industry standard.

Part of that work will center on remedying several big gaps in current ATM standards, McGee said. For example, the ATM Forum has no plans to come up with a signaling protocol that would support interoperability across different ATM products. This is needed if users want to mix and match different ATM hubs and routers, as well as carriers' ATM services, in a cohesive, multimedia network, McGee said.

IBM has already developed "Advanced Network Control" protocols that define how ATM nodes can communicate to manage bandwidth, control congestion and set up workable routes across the network, McGee said. A key part of this BNA component is an intelligent directory for managing resources across an ATM backbone, no matter what network protocol those resources use.

However, IBM may have trouble getting its protocols adopted as standards in the ATM arena "where SNA is just one protocol out of many," said Rosemary Cochran, a principal at Vertical Systems Group in Dedham, Mass. IBM's specifications will compete against similar efforts by other ATM vendors, she added.

The above services will be available for IBM's ATM and Packet Transfer Mode switches, due in about 18 months.

Looking forward

Today's Advanced Peer-to-Peer Networking protocols would not become obsolete as a result of IBM's plans but would continue to manage routing and resource management across multinode SNA networks. BNA would work to manage resource-addressing across the underlying ATM backbone, said Rick McGee, IBM's director of networking systems architecture.

More immediately, IBM plans early next year to introduce the first products based on High-Performance Routing (HPR), an enhancement that is said to make APPN faster than TCP/IP. HPR will also incorporate sophisticated internetworking features that might be considered previews of IBM's ATM protocols.

For example, HPR nodes will provide adaptive rate-based congestion control. And they will monitor traffic patterns to help predict future bottlenecks and bandwidth needs and automatically adjust transmission speeds for optimal line utilization.

— *Elisabeth Horwitt*

Put The Power Of Your AS/400—On Your Lap

InterLynx®/400 makes the remote Mac or PC connection to your AS/400® from wherever you are.

Query your AS/400 from your desk or hotel suite. Download files and combine data and laptop graphics in one sit-down session.

A standalone unit, InterLynx doesn't require a free slot in your Mac or PC. Add a modem and Andrew software, and you've got all you need for dynamic AS/400 access.

And whether you've dialed in from a Mac or PC, InterLynx supports 5250 emulation and file transfer software. Your laptop becomes a true 5250 terminal.

This means convenient laptop-access to the vast data storage of your AS/400 at any time, from any time zone.

The portability of a laptop and the power of an AS/400—brought together by InterLynx/400 and Andrew.

United States
(800) 328-2696 ext 281
Europe
(+44) 734 894689
International
(708) 349-5440
FAX
(708) 349-5673

Call for your free Midrange Connectivity Guides

Complete Communications™

ANDREW

InterLynx is a registered trademark of Andrew Corporation. AS/400 is a registered trademark of IBM Corporation. © 1993 Andrew Corporation

News Shorts

The CIO phones ring

Sprint Corp. Executive Vice President and Chief Information Officer Ron J. Ponder is about to switch phone companies and take on the newly created position of senior vice president and CIO at AT&T. Separately, Arlington, Va.-based **Bell Atlantic Corp.** has nabbed Ralph J. Szygenda, **Texas Instruments, Inc.**'s information systems and services vice president and CIO. The longtime Texan will become Bell Atlantic's IS vice president and CIO, effective June 28.

IBM to support CICS on NT

IBM said last week it will develop a version of its CICS transaction-processing monitor to run under **Microsoft Corp.**'s Windows NT but did not specify its cost or availability date. The monitor is already available across most IBM hardware platforms and is also on **Hewlett-Packard Co.** and **Apple Computer, Inc.** Macintosh computers.

AT&T makes ATM strides

AT&T said last week it will begin a 9,000-mile trial of Asynchronous Transfer Mode (ATM) networking technology with Japan's primary telecommunications carrier, **Kokusai Denshin Denwa**, next month. To date, production ATM rates have not exceeded 155M bit/sec., though statewide ATM networks at slower speeds from regional carriers are coming up in North Carolina and New York.

Viruses threaten national info-structure

Representatives from U.S. industry joined the **National Computer Security Association** in Washington, D.C., last week to brief the public and the press on computer viruses. At the kickoff of the first annual National Computer Virus Awareness Day, held on Capitol Hill, users and computer security experts warned that the virus problem continues to escalate and threatens implementation of President Clinton's National Information Infrastructure. The kickoff was followed by a hearing on computer security chaired by Rep. Edward Markey (D-Mass.).

Computer Associates goes consumer

Computer Associates International, Inc. made its first splash in the consumer software market a bold one. CA introduced a Microsoft Windows-based personal finance package, called Kiplinger's CA-Simply Money, with plans to distribute free copies to the first 1 million people who request it. The toll-free phone number was besieged with requests for the package last week, with more than 1,300 calls each hour.

SHORT TAKES The move from analog to digital transmission of cellular telecommunications will greatly increase the difficulty of eavesdropping on cellular phone conversations and may ultimately resolve the cellular privacy problem, a new **Federal Communications Commission** report said.... **Micropolis Corp.** will announce price cuts today of up to 40% and **Novell, Inc.** compatibility for its Raidion LT line of fault-tolerant, 3½-in. RAID-5 storage subsystems.... Dennis H. Jones, CIO at Memphis-based **Federal Express Corp.**, was named 1993 IS Executive of the Year by the Lattanze Center for Executive Studies in Information Systems at **Loyola College** in Baltimore.... **Red Brick Systems** plans to unveil this week Version 2.0 of Red Brick Warehouse, a decision support database.... **Gupta Corp.** ported SQLWindows 4.0, a client/server development environment, to IBM's Application System/400.... **Nippon Life**, the world's largest insurance firm, has bought 2,000 AS/400s to use for all its customer-service applications.

X Windows, NT: Friends or foes?

By Joanie M. Wexler
SAN JOSE, CALIF.

■ The X Window System's days could be numbered, according to some attendees at last week's Xhibition '93 conference and trade show.

The anticipated force behind X's eventual demise is — what else — Microsoft Corp.'s Windows NT. The fledgling operating system weighed heavy on users' minds as they tried to get a grip on what is predicted to be the development platform of the future.

The NT threat to X, which functions as network "glue" among heterogeneous systems, lingered despite moves by several vendors to announce or demonstrate X development tool kits and X server software for NT last week. These companies included Age Logic, Inc., Congruent Corp., Digital Equipment Corp., Hummingbird Communications Ltd. and Network Computing Devices, Inc.

X marks the spot

These firms' X products will represent NT's meal ticket into many corporate enterprises — particularly Unix-heavy shops — and also protect user investments in X applications. Still, NT's inherent terminal emulation and 32-bit graphics application programming interface may eventually usurp X — sooner for some than for others.

For example, JC Penney Co. has already decided to move from X to NT, said Jim Ducatelli, manager of advanced technology at the Dallas-based department store chain. The reason is "the power of Microsoft, Bill Gates and the history of the company to provide applications economically," he said.

X is an architecture based on Transmission Control Protocol/Internet Protocol (TCP/IP) networks that allows users to tap into multiple networked hosts and display the various applications on their screen at the same time. That function parallels in the networked world what Windows allows users to do with their local applications.

X is also a bit-mapped protocol that puts very high-quality graphics displays on the user's desktop while distributing processing across the network. This "client/server" orientation is what will keep X alive for the next five to 10 years, according to Arthur Kreitman, president of New York-based Congruent.

Congruent introduced a tool kit at the show that allows developers to quickly recompile X applications to NT.

For the short term, "X is an easy way to build client/server applications because all the problems have been solved for you — like which part of the application to put on the client and which part goes on the server. But eventually, we will learn to restructure applications ourselves to support the client/server model, and X will be increasingly marginalized," Kreitman said.

Much speculation

Other opinions as to how complementary or competitive X and NT will be were all over the map.

"Within a year, there will be a dozen implementations of Telnet and FTP [TCP/IP services] from different vendors for NT," predicted X advocate Robert Dew, an electrical engineer at the National Institutes of Health in Washington, D.C. "None of them will interoperate."

However, Microsoft is relying on TCP/IP — the foundation of most corporate networks — and its related services for connecting NT into the corporate enterprise, said Mark Lewin, manager of Unix/independent software vendor relations at Microsoft.

For the small percentage of companies using X to consolidate multiple dumb terminals into one desktop box, NT will compete, Lewin acknowledged. However, for performing processing on a host and displaying output locally, NT will not match X, he said.

"NT may provide the connectivity piece but not the interoperability with nongraphical systems like mainframes that X does," added Richard Calligan, manager of the software development group at Advanced Research and Applications Corp. in Sunnyvale, Calif., an X tool kit developer.

On the other hand, NT could actually help X, said a software engineer at Boeing Computer Services who asked to remain anonymous. "If you have Unix programs hanging around and you want to get to them, you'll need X."

Larry Austin, computer systems specialist at The World Bank in Washington, D.C., said his company has no formal position on NT. However, he uses X server software "to allow us to choose our operating system and user interface separately." In that respect, there is no reason why X and NT could not complement each other, he said.

Reporter's Notebook

Heated opinions, pearls of wisdom and predictions for making users winners in the client/server world circulated on the Xhibition '93 floor. Among them were the following:

▶ "COSE [Common Open Software Environment] was a knee-jerk reaction to the Microsoft threat. One way COSE could add value would be to ask for user participation — something they don't get in Redmond," grumbled David P. Grubb, manager of computing standards and technology assessment at the **University of California Lawrence Livermore National Laboratory.**

▶ **Judith Hurwitz, president of Hurwitz Consulting Group,** however, challenged the user community to insist on participation in the Microsoft process, too, or "you will get what you deserve." If users don't speak up to Bill Gates and company, she said, "it will end up like the era when IBM dominated the industry and there was a slow pace of change for 20 years."

▶ The percentage of information systems staffs surviving the transition to client/server averages just 30%, said Allen Puller, director of open systems at **Computer Associates International, Inc.** in Islandia, N.Y.

▶ To counter this, Sheri Anderson, senior vice president of production and systems services at **Charles Schwab & Co.**, where an estimated 80% to 90% survive, advised building a "nurturing" corporate culture that allows users dabbling in client/server technology to "make mistakes comfortably." When it comes to training, "do it over and over," she said. "People just don't get it easily. You have to repeat things frequently."

▶ "Spend as much money on education and training as you do on development tools," added Donald L. Dall, managing director of **Andersen Consulting**'s client/server application development division. — *Joanie M. Wexler*

After FOCUS, Everything Else Is Yesterday's News.

FOCUS From Information Builders. The Open Systems Database Independent 4GL With All The Tools For Superior Applications Development.

LET'S BE OPEN ABOUT OPEN SYSTEMS

Getting tired of hearing about how Open Systems are going to revolutionize the way you process information — without anyone actually explaining how this miracle is going to work?

Let alone, how much it's going to cost?

Relax, because now there's an Open Systems solution that's not only easy to use, it's also simple to implement.

ROCKET SCIENCE IS NOT REQUIRED

It's called FOCUS for UNIX from Information Builders. The leading specialists in distributed information systems. With more than one million users in every one of the Fortune 100, FOCUS is the number one 4GL for end user computing and application development.

And best of all, FOCUS delivers the true promise of Open Systems across virtually every platform. And it does it seamlessly and cost effectively.

WORK WHERE AND HOW IT SUITS YOU

And because FOCUS is totally portable, it provides an alternative to mainframe and other proprietary system upgrades. Simply migrate existing applications and new development to scalable UNIX systems.

You'll increase productivity while you reduce costs.

BE MORE ENTERPRISING

True Open Systems will create a radical change in data distribution. And with FOCUS for UNIX the potential for turning that data into useful information will be almost limitless. Which might be the best news you'll hear for a long time to come.

For more information on the best Open Systems 4GL there is, or to attend a FREE Seminar...

CALL 800-969-INFO
In Canada call 1-416-364-2760

IBI FOCUS
Information Builders, Inc.

This advertisement refers to numerous products by their trade names. In most, if not all cases, these designations are claimed as trademarks or registered trademarks by their respective companies. FOCUS is a registered trademark of Information Builders, Inc. 1250 Broadway, New York, NY 10001.

See Us At Client/Server World, Booth #804 And Don't Miss The EDA/SQL Pavilion

Announcing the first network printer

Operating System	Topology
Novell Netware	**Ethernet/802.3*
	Token Ring (4/16 Mbps)
*Microsoft**	**802.3*
LAN Manager	*Token Ring (4/16Mbps)*
Windows for	**802.3*
Workgroups	*Token Ring (4/16 Mbps)*
Windows NT	**802.3*
	Token Ring (4/16 Mbps)
IBM LAN Server	**802.3*
	Token Ring (4/16 Mbps)
AppleTalk	**LocalTalk*
	**EtherTalk*
*HP-UX***	**Ethernet*
*SunOS***	**Ethernet*
*Solaris***	**Ethernet*
*SCO UNIX**	**Ethernet*

*Standard in the HP LaserJet 4Si MX printer. **For operating HP-UX, SunOS or Solaris, a one-time purchase of $199 in configuration software is required. Adobe and PostScript are trademarks of Adobe Systems Inc. which may be registered in certain jurisdictions. Microsoft is a U.S. registered trademark of Microsoft Corporation. UNIX is a registered trademark of UNIX System Laboratories Inc. in the U.S.A. and other countries. †In Canada call 1-800-387-3867, Ext. 7299
© 1993 Hewlett-Packard PE12353

Multiple environments are no longer worlds apart. Even if you have Novell Netware on one network, HP-UX on another and EtherTalk on a third, the new HP LaserJet 4Si MX printer easily connects across platforms. Automatically.

The HP LaserJet 4Si MX printer comes out-of-the-box preconfigured for multiple environments. There's nothing more to do than plug-and-play. All interfaces are simultaneously hot, making switching so seamless, end-users won't even notice.

What's more, HP's LaserJet 4Si MX printer is ready to handle whatever needs come down the

that adapts to multiple environments.

pike. More operating systems? No problem. As your network system continues to evolve, the capabilities of this printer are no longer just impressive. They're indispensable.

The HP LaserJet 4Si MX printer is loaded with features that define state-of-the-art. HP's enhanced PCL5 and genuine PostScript™ Level 2 software from Adobe™ come standard. Printer environments are saved while switching. Setup is a cinch with network software utilities and drivers included in the box. And, if you need any reassurance about trouble-free operation, you have it in our Simple Network Management Protocol (SNMP) support.

At 17 ppm, this is the fastest LaserJet ever, with I/Os and RISC-based formatter capabilities matched to support its speed. It delivers impeccable 600 dpi print quality—thanks to HP's microfine toner and Resolution Enhancement technology. Plus, it comes standard with two 500 sheet input trays.

But what if you don't need the full capabilities of the HP LaserJet 4Si MX printer right away? HP offers another printer that's probably a perfect fit. The HP LaserJet 4Si printer delivers the identical 17 ppm performance and superb 600 dpi print quality. It also has room to grow. The two MIO expansion slots let you add HP JetDirect network interface or third party cards. And you can add on Adobe's genuine PostScript Level 2 software and SIMM memory modules, as you need them.

To find out more about the multiple-network HP LaserJet 4Si MX printer and the upgradable HP LaserJet 4Si printer just call 1-800-LASERJET, Ext. 7299.† Capabilities this advanced make a world of difference—in any environment.

HEWLETT PACKARD

'SuperAgent' eases network control

By Joanie M. Wexler
SUNNYVALE, CALIF.

Companies trying to get an automated grip on their sprawling networked computing environments finally found themselves en route to their goal last week when SynOptics Communications, Inc. announced a distributed information-gathering technology spanning desktops, systems and local- and wide-area network devices.

The "SuperAgent" technology, supported by enterprise management bigwigs Hewlett-Packard Co., IBM and SunConnect, Inc., will allow a single application running on these vendors' platforms and SynOptics' Network Control Engine in its smart wiring hubs to perform a specific task across multiple vendors' devices, technologies and protocols.

Intel Corp. and Novell, Inc. are participating by contributing software that allows desktop devices, operating systems, applications and servers to be included in the management sweep.

Combined with these platforms and software, SynOptics' SuperAgent serves as the eyes and ears of a distributed application covering hundreds to thousands of devices and reporting to the integrated central application on a single type of network behavior or attribute. This contrasts with most management approaches, where multiple applications separately gather detailed data about a single type of device, which is not usually integrated in an enterprise context on the management console.

"It boils down to economics and productivity," said Carl B. Condon, director of communications at SynOptics shop Bell Sygma Systems Management, an information technology outsourcer in North York, Ontario. "We've seen an explosion of protocols, and our network will grow from about 30,000 to 40,000 nodes over the next 18 months. It's hard to keep enough [human] skill levels out in the field; this helps us put more expertise back in a central place."

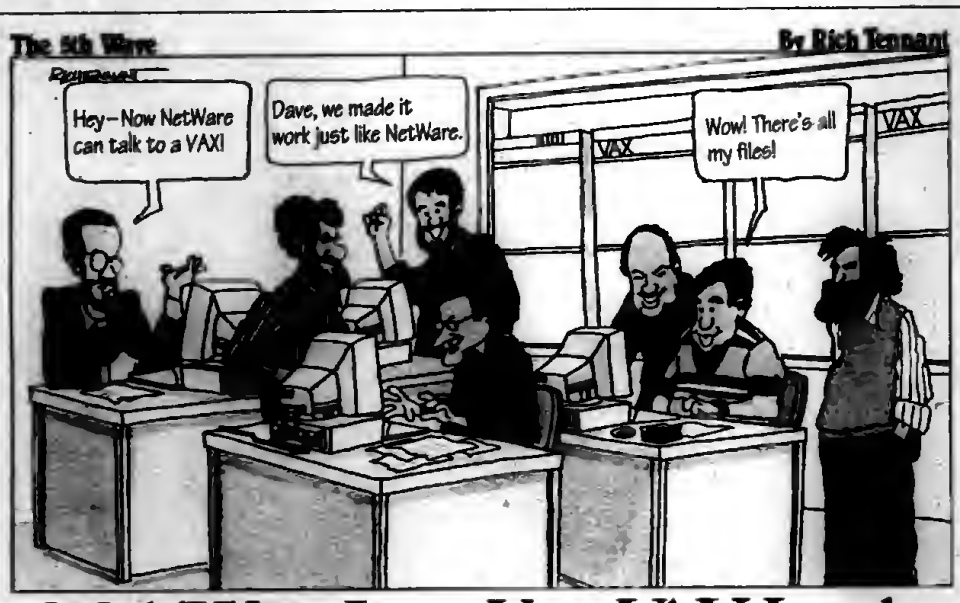
One SuperAgent-based application, concurrently announced by SynOptics partner NetLabs, Inc. for HP, IBM and Sun Microsystems, Inc. platforms, takes inventory of the devices, operating systems and applications running throughout the entire corporate network, precluding armies of workers from having to manually inspect and record equipment serial numbers, software versions and the like.

"While we expect our network to double in the next 18 months, we won't be doubling our staff," said Marcus Salyer, network manager at The Ohio State University in Columbus, a SynOptics shop looking to test SuperAgent technology this summer. Keeping tabs on equipment and software is especially important in an academic environment, Salyer said, because vendors often lease to universities computer products that they want back at a contracted time.

Ohio State is generally excited about off-loading routing data analysis to the network. "We want to push as much [automated] intelligence out into the network as possible to tell us what's wrong before users figure it out and so we can tell the network certain types of behavior we don't want," Salyer said.

SynOptics has not yet found a WAN management partner; however, SuperAgent-based applications will manage any equipment that complies with the Simple Network Management Protocol Management Information Base (MIB) II, including Digital Link, Inc.'s WAN access equipment, said Karen O'Neill, manager of SynOptics' integrated management program. The applications will also manage any systems conforming to the Host Resources MIB, a draft Internet Engineering Task Force standard, she said.

"The industry is very hungry" for such broad management, said Charlie Robbins, director of communications research at Boston consultancy Aberdeen Group. "The person who cares is the CIO. With all the complexity [of] LANs, operating systems and such, you don't know what you have anymore."



MultiWare Lets Your VAX Look Just Like A NetWare Server.

If you have a VAX™ in the back room, chances are good you also have a bunch of PCs running Novell® NetWare.®

Now your NetWare users can be VAX users too, with MultiWare.™ That's because MultiWare lets you provide OpenVMS™ file and print services to your NetWare users – with total transparency. For NetWare users, the best part will be all those OpenVMS files appearing right on their screens.

MultiWare is the very latest "drop in and run" enhancement to the MultiNet® multi-protocol environment for OpenVMS, including VAX and Alpha AXP™ systems. Since it's completely supported on the server side, your PC users don't need to do a thing. Other than sit back and enjoy the benefits of a lot more disk space, the use of any OpenVMS printer and the feeling of satisfaction they'll get from accessing OpenVMS files.

AXP

MultiWare runs over the SPX/IPX protocol stack, so it doesn't require TCP/IP or any alternate protocol. MultiWare even comes with a shareable library that lets developers write distributed OpenVMS applications with the look and feel of NetWare, integrating existing NetWare resources via SPX/IPX.

In fact, MultiWare operates so much like native NetWare that your PC users will be amazed they're talking to a VAX. MultiWare supports all the familiar login, file, and print requests your NetWare users already know. Moreover, MultiWare takes full advantage of Novell NetWare's very fast data transfer rates.

We're so confident you'll like MultiWare, we'll let you try it FREE for 30 days.

Then you can trade in your current host-based NetWare-to-VMS™ product and receive credit for up to 100 percent of its value.*

Call us right now for the facts on the MultiWare NO-RISK 30-day FREE trial offer. It may look and act like NetWare, but that's really your VAX talking to your NetWare users.

1-800-TGV-3440

TGV™

Designed To Outrun The Competition

*Not to exceed 50% of your MultiWare license fee. MultiNet is a registered trademark and MultiWare and TGV are trademarks of TGV, Inc. NetWare and Novell are registered trademarks of Novell, Inc. The AXP mark, AXP, VAX, VMS and OpenVMS are trademarks of Digital Equipment Corporation. TGV, Inc. 603 Mission St., Santa Cruz, CA 95060. Tel (408) 427-4366, Fax (408) 427-4365. ©1993 TGV, Inc. 1424

NAIL THIS TO YOUR CEO'S DOOR, NOW.

In 1993, 4th Dimension Software will deliver the only way to control all your computers — using MVS, VAX/VMS, UNIX and AS/400 operating systems, to name just a few — no matter where they're located, from a single RS/6000 or SPARCstation. We call it the Enterprise ControlStation. Once you've seen what it can do for you, we're betting you won't let us unplug our no-obligation demonstration unit.

Dear CEO. Please don't hang the poor yutz who nailed this to your door. Just send us the repair bill (and if you wouldn't mind, a photograph of the ad stuck to that door). It's a small price to get your attention. We're 4th Dimension Software, and we've come from nowhere in a few short years to *dominate* data center automation and enterprise-wide, distributed systems management. Perhaps you remember how we became Computer Associates' worst nightmare by converting over 600,000 jobs from CA-7 to our Job Scheduling and Production Control system, CONTROL-M.™ During the April 1992 LA riots, our software ran U.S. Borax's computers without human intervention for 36 hours from their *vacated* U.S. headquarters. And our products are used to run The United Illuminating Company's computers *unattended* on weekends. While other companies are only talking about enterprise-wide automation, 4D is delivering it.

You can no longer afford to train and keep different MVS, UNIX, VMS and AS/400 experts. Our Enterprise ControlStation is client-server based and gives enterprise-wide, distributed, platform-independent control to a *single* operator from a *single* workstation. Now, *anyone* can use the 4D Enterprise ControlStation to zoom in on operational problem areas *anywhere* in the world. Not only can you schedule resources, correct problems and perform restarts and reruns, but you can also simulate future events and play them back after-the-fact to better understand problems. You can even create high-resolution job documentation and color flowcharts from our SQL database.

We'd be happy to give you a no-obligation, on-site Enterprise ControlStation demonstration. Once you've seen it, you won't let us disconnect it. In fact, you *might* even give us permission to use the photograph of *this* ad, nailed to *your* door, in one of our future ads!

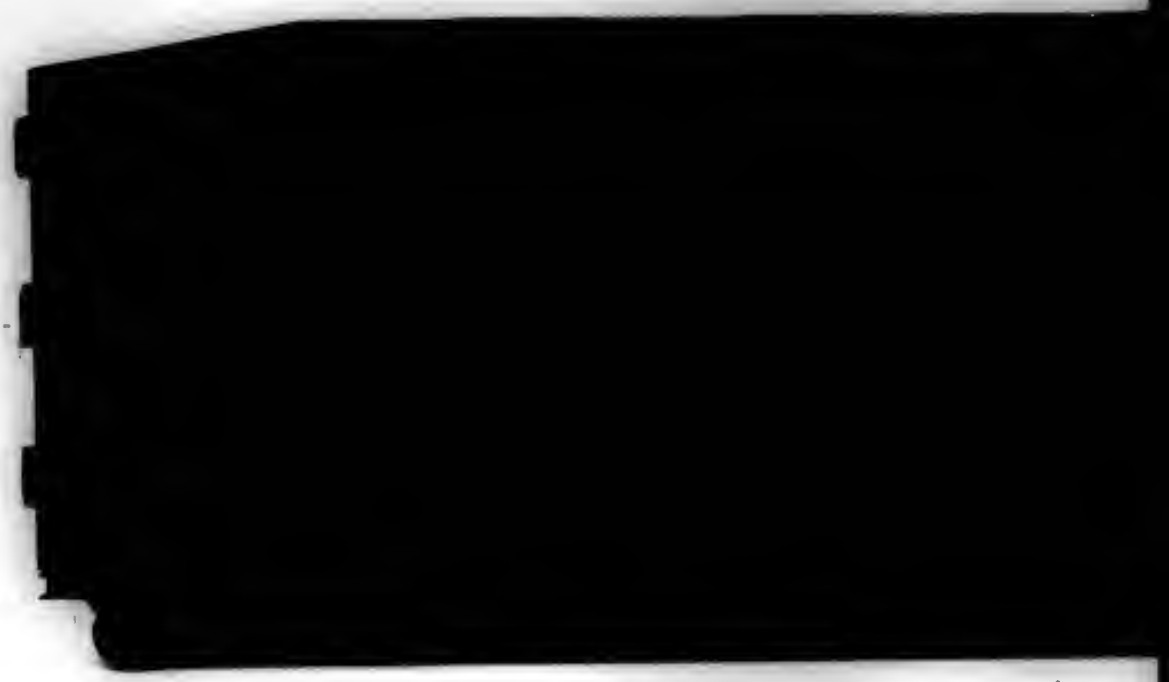
4D

4th DIMENSION SOFTWARE INC.

CALL US AT **800-347-4694 EXT. 2002** (OR 714-757-4300 FROM OUTSIDE THE UNITED STATES), TODAY. BEFORE YOUR CEO HAS MORE TO WORRY ABOUT THAN A TINY HOLE IN HIS OFFICE DOOR.

© 1993 by 4th Dimension Software Ltd. Enterprise ControlStation and Control-M are registered trademarks of 4D. The other products mentioned are trademarks of their respective companies.

TRBA



IMAGINE A COMPUTER SYS THIS PIECE OF HARDWA

The problem with most computer systems is that they've already reached their peak levels the day they arrive at your site. There's little you can do to improve speed, power or functionality, and within a few years, you have to think about a replacement.

We think that's garbage, especially when you consider the costs of software conversion and user retraining. And we proudly offer an alternative – our OpenVMS environment.

OpenVMS makes obsolescence obsolete.

OpenVMS is fully upgradable and scalable through Alpha AXP, the leadership RISC architecture designed for the next 25 years. A technology so advanced, Alpha AXP lets you implement the system today and not have to worry about

© 1993 Digital Equipment Corporation. The Digital logo, Alpha AXP and Open VMS are trademarks of Digital Equipment

TEM THAT WON'T REQUIRE RE IN FIVE OR SIX YEARS.

changing it. In alliance with OpenVMS, it also delivers a quantum leap in price/performance and functionality, as well as interoperability with open systems through compliance with X/Open and POSIX standards.

This is in addition to the OpenVMS environment's easy-to-use software, best development tools, over 10,000 existing applications and its power to work with other computer systems you may already have – from Macs to mainframes.

AXP™

Which means an OpenVMS system keeps your existing computers off the scrap heap as well, making it as attractive to management as it is to MIS. And prompting you to throw out only one thing – your preconceptions about how computer companies work. Call 1-800-DIGITAL, touch 2 and ask for ext. 69J.

digital™

Corporation. X/Open is a trademark of X/Open Company Ltd. Mac is a registered trademark of Apple Computer, Inc.

Electronic publishing

Adobe to unveil cross-platform Acrobat

By Michael Vizard
MOUNTAIN VIEW, CALIF.

After two-plus years of development, Adobe Systems, Inc. will make good this week on its promise to fundamentally change the way individuals approach electronic documents.

This week in New York, Adobe is set to deliver its Portable Document Format (PDF) technology, which it will market under the name Acrobat. The arrival of PDF means that users of documents created using PostScript fonts will, for the first time, be able to read electronic documents regardless of which authoring tool or platform was used to create that document.

For example, a document created in WordPerfect Corp.'s WordPerfect word processor on the Microsoft Corp. Windows platform will be readable by a user on an Apple Computer, Inc. Macintosh, DOS or Unix platform.

"We're talking about a fundamental change in terms of replacing paper with electronic paper," said Esther Dyson, president of EDventure Holdings, Inc. in New York. "With Acrobat, you'll be able to give people documents to read across platforms and [still] maintain the integrity of the document in terms of its look and structure." However, she said users must understand that Acrobat only provides the ability to read or annotate documents (see chart).

"We're not talking about document exchange; we're talking about not creating unnecessary paper. People who produce paper should be worried; people who want to save trees should be thrilled," Dyson said.

One of the first companies to adopt Acrobat will be R. R. Donnelly & Sons Co., which is one of the world's largest printing companies.

"We'll be adopting Acrobat both internally for our own use as well as for the use of our customers," said Greg Phipps, a marketing manager at the printer's Waltham, Mass., office.

"The problem with electronic distribution of documents is that you couldn't maintain the vividness of the presentation. With Acrobat, you can maintain the headers, footers, graphics and bullets across platforms," Phipps said.

Phipps said R. R. Donnelly expects its publishing customers to begin offering site licenses for their publications. "For example, you might license something like *BusinessWeek* for distribution [electronically] across your site," Phipps said. Customers will benefit from lower subscription rates across a larger number of readers, while publishers will be able to cut down on their subscription and mailing costs, he added.

How successful Acrobat will be, however, will be directly tied to Adobe's ability to overcome resistance from Microsoft and Apple, which are jointly pushing an alternative to PostScript.

"The technology is there, but it won't become a standard until it is widely used. I suspect Microsoft and Apple won't support it until they have to," Dyson said.

John Warnock, Adobe's chief executive officer, said that because most documents are created using PostScript fonts, users will not have to change anything to take advantage of Acrobat.

Jumping through hoops

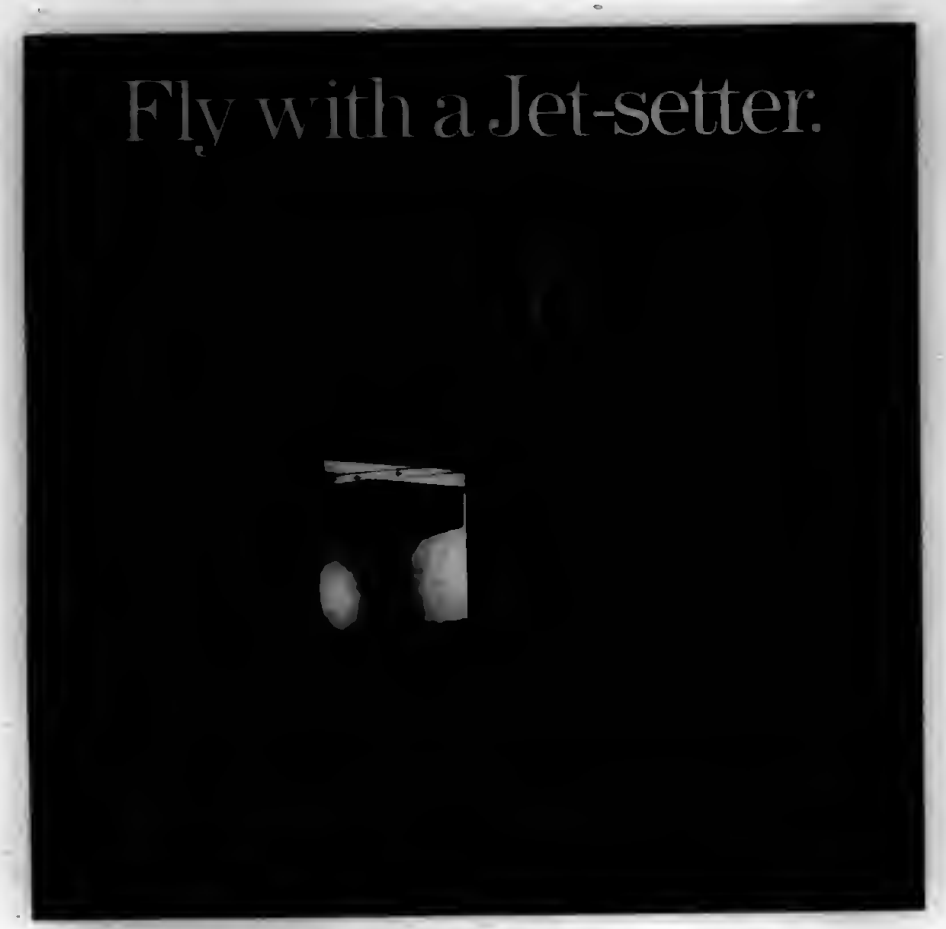
Major Acrobat components

Acrobat Reader
- Read-only software that allows users to view, navigate and print documents created in Portable Document Format (PDF).

Acrobat Exchange
- Allows users to annotate PDF files in addition to viewing.

Acrobat PDF Writer
- Produces PDF files from applications.

Acrobat Distiller
- Translates PostScript files into PDF files.

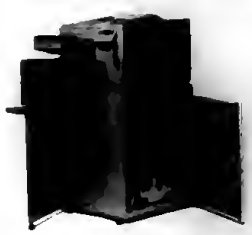


The HP Output Stacker is a great place for documents to land after a whirlwind trip through the HP Paper Feeder and HP LaserJet 4Si or 4Si MX printer.

With the 1500-sheet *HP Paper Feeder* keeping your 17-page-per-minute printer busy on one end, the 2000-sheet *HP Output Stacker* makes sense on the other end. Especially in networked environments. Use the printer's upper output bin for smaller print jobs, the HP Output Stacker for heavier volumes. Together, the HP Paper Feeder and Output Stacker let your printer work unattended, day or night—even on weekends—without someone to put paper in or take it out. So you save both time and labor costs.

And the HP Output Stacker fits squarely under the printer—with just enough surface area to match the footprint of your printer and HP Paper Feeder. Lockable casters make it safe and easy to move from location to location.

Take high-capacity printing to new heights. See your authorized HP reseller or contact your HP sales representative. For more information call 1-800-752-0900, ext. 7009.



If the printer's output bin meets your needs, look into the HP Paper Feeder and the *HP LaserJet Printer Cabinet*—custom designed to hold supplies, as well as the printer.

HEWLETT PACKARD

Introducing *ObjectView*® 2.0. The client/server development tool that does more, is easier to use, and costs less. Guaranteed.

Discover the pow

ObjectView 2.0 now fo

Knowledge is power, and at the heart of knowledge is information. The power to perform at the peak of potential depends on the ability of your enterprise to access and manage information quickly, flexibly and simply, from any desktop.

Which is why ObjectView 2.0 from KnowledgeWare is arguably the most powerful Windows™-based tool available for creating mission-critical client/server applications ranging from decision support to on-line complex processing. ObjectView 2.0 combines power with an intuitive interface and an open architecture that supports a wide range of databases and products. So your company can reap the benefits of client/server *today*.

Save $1,800 with this no-risk offer

If you've ever considered the move to client/server or even if you're using another product, you owe it to yourself to take advantage of this offer. **Because for a limited time we're offering ObjectView 2.0, regularly $2,799, at an introductory price of just $999. Try it risk-free for 30 days.** Your satisfaction is guaranteed or we'll refund the sale price. But we're confident you'll be impressed by ObjectView 2.0, and here are just some of the reasons why:

Power without complexity

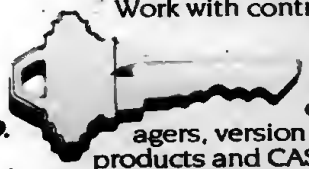
What good is power if you can't put it to work? ObjectView 2.0 has the built-in intelligence to access up to eight relational databases from a single application. The unique panel object gives developers unmatched flexibility to design interfaces independent of underlying databases. A spreadsheet object and built-in business graphics enable end users to calculate, analyze, format and incorporate 11 types of graphs, all without exiting the application or the burden of buying new software.

Development at warp speed

With ObjectView 2.0, you're able to deliver what users want, *fast*. Get a headstart with ObjectView 2.0's automatic application developer. Then iteratively develop applications based on user reactions to actual screens. Further customize applications with flexible scripting power: high-level commands, enriched BASIC, C or C++. Finally, depend on an interactive debugger to tweak final applications, even at the SQL level.

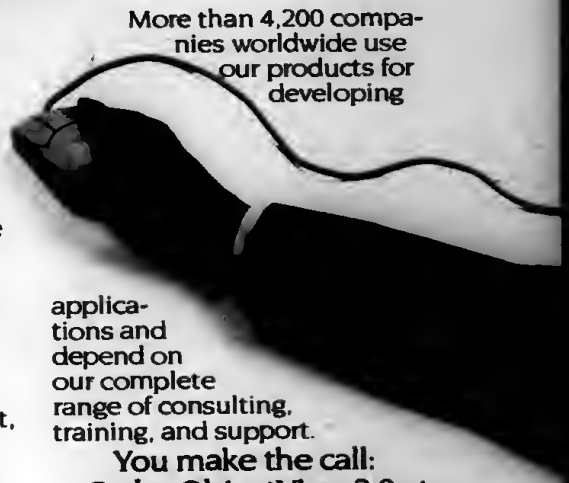
Our open-door policy

ObjectView 2.0 supports all major databases and gateways.



Work with controls and libraries, report writers, source code managers, version control products and CASE products,including KnowledgeWare's Application Development Workbench® and Flashpoint®.

ObjectView is backed by KnowledgeWare's experience in servicing, enhancing, and integrating software tools.

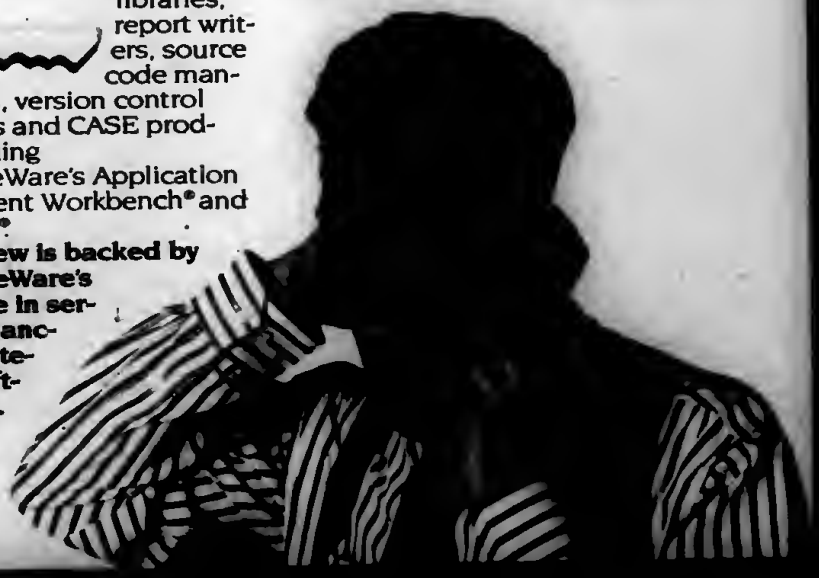


More than 4,200 companies worldwide use our products for developing applications and depend on our complete range of consulting, training, and support.

You make the call: Order ObjectView 2.0 at 1-800-295-0570

With a major credit card, you can order ObjectView 2.0 risk-free over the phone. Our operators will even tell you how to order with a check or purchase order. But call now to take advantage of our limited $999 Introductory offer. And discover the power of ObjectView 2.0.

KnowledgeWare®



TICK

THIS MOMENT IN THE LIFE OF AN IT MANAGER IS ABOUT

TO BE SOLVED BY SOLARIS, THE OPERATING

ENVIRONMENT THAT CONNECTS THE ENTIRE ENTERPRISE.

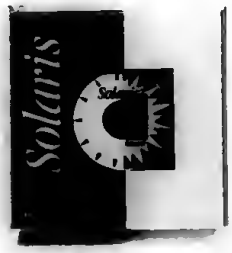
THERE ARE TIMES WHEN YOU'RE SURE THE WHOLE ENTERPRISE WILL NEVER GET RIGHTSIZED. HELP IS HERE.

IT'S SOLARIS.

IT'S FROM SUNSOFT AND NOW AVAILABLE FOR x86 AS WELL AS SPARC® — THE MOST POPULAR CISC AND RISC ARCHITECTURES. WITH THE SOLARIS® SOFTWARE OPERATING ENVIRONMENT YOU'LL CONNECT YOUR ENTIRE ENTERPRISE — HARDWARE AND SOFTWARE — AND RUN IT LIKE ONE WELL-OILED MACHINE.

SOLARIS IS THE RIGHT 32-BIT SOLUTION FOR A WORLD WHERE MANAGEMENT EXPECTS YOU TO DO MORE WITH LESS, TO MAXIMIZE THE RESOURCES AT YOUR DISPOSAL, TO PROTECT YOUR EXISTING HARDWARE AND SOFTWARE INVESTMENTS, AND PROVIDE EVEN MORE POWER, PRODUCTIVITY AND FASTER TIME TO MARKET. SOLARIS GIVES YOU VIRTUALLY UNLIMITED ACCESS TO ALL SYSTEMS ON YOUR LANS AND WAN.* WHAT'S MORE, IT'S SCALABLE FROM PCS TO MAINFRAMES.

SOLARIS HARNESSES AND CIVILIZES THE POWER OF UNIX®, THE PROVEN STABLE ENVIRONMENT AND LEADING 32-BIT DISTRIBUTED COMPUTING SOLUTION. UNIX IS RENOWNED FOR HIGH PERFORMANCE MULTITASKING, MULTITHREADING, AND MULTIUSER CAPABILITIES. AND SOLARIS RUNS MORE 32-BIT APPLICATIONS THAN ANY OTHER OPERATING ENVIRONMENT — OVER 7,500 INCLUDING LEADERS LIKE COMPUTER ASSOCIATES, ORACLE AND LOTUS. SOLARIS RUNS WINDOWS AND DOS, TOO. YOU'LL ALSO DISCOVER AN EXCELLENT SOFTWARE DEVELOPER ENVIRONMENT AND A SEAMLESS TRANSITION TO DISTRIBUTED OBJECT COMPUTING.



IF ALL THIS SOUNDS LIKE THE SOLUTION YOU'RE LOOKING FOR, DON'T WASTE ANOTHER SECOND. .
CALL 1-800-227-9227.

SunSoft

THE NETWORK IS THE COMPUTER™

©1993 Sun Microsystems, Inc. Sun Microsystems, SunSoft, the SunSoft logo, the SunSoft tagline, and Solaris are trademarks or registered trademarks of Sun Microsystems, Inc.
SPARC is a registered trademark of SPARC International, Inc. UNIX is a registered trademark of UNIX System Laboratories, Inc.
All other registered trademarks are the property of their respective companies.
*Third-party software may be required.

TOCK

CW Honors Tech Wizards

Program recognizes innovative use of technology as engine of change

ALL PHOTOS BY CHIP SIMONS

Winners [illegible] Comp[illegible] is cale[illegible] wee[illegible] attended [illegible] honors the [illegible] informatio[illegible] creative heroes [illegible] future generations

Enjoy[illegible] the p[illegible] were (from left) Paul [illegible] (Fannie Mae) Pete Freedman (Georgia Institute of Technology) and Larry Gary (Fannie Mae)

Dennis Jones of Federal Express Corp. takes time out to demonstrate the durability of a Fedex letter envelope

[illegible]

"No more code

Gary Slattery, Software Developer, Computer Associates

Now runs Windows 3.1 apps for increased productivity.

"I develop software applications for a living and I think OS/2® is a great way to do business." A 32-bit, virtual memory operating system, OS/2 is the ideal platform for developing your DOS, OS/2, Windows® and even host-based applications.

With OS/2 you can boost the power of your favorite DOS and Windows tools, plus take advantage of over 250 available OS/2 development tools and utilities. "I use CA Realizer to prototype new graphical interfaces. I write code using CA C++ and CommonView™ (integrated with IBM's C Set/2™ compiler) while I compile in the background. And when designing reports or planning schedules, I use CA-RET."

Improved multimedia, CD-ROM, PCMCIA and pen support.

OS/2's pre-emptive multi-threaded multitasking dynamically manages CPU time so you can run DOS, Windows and OS/2 apps concurrently in different sessions with maximum efficiency. That means you can edit in one window, compile in another, link in a third and test in a fourth. With OS/2 Crash Protection,™ if one application goes down due to a bug, the rest you're working on won't. "There's no limit to what you can do with this system.... It's definitely made me more productive."

Realizer

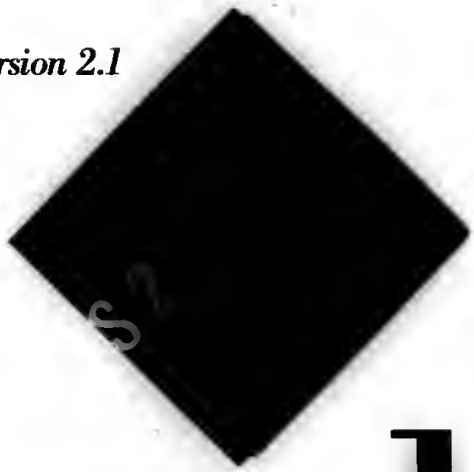
The object-oriented user interface—the Workplace Shell™ (WPS)—gives you easy control with direct manipulation of visual objects on

The Development Platform of Choice.

- Enhanced development platform for DOS, Windows and OS/2 apps.
- OS/2 Crash Protection for superior reliability.
- Pre-emptive multitasking for increased productivity.
- Virtual memory provides up to 512MB per session.
- Flat memory model eliminates wrestling with segments.
- Multiple virtual DOS machines for concurrent app testing.
- Object-oriented Workplace Shell is easy and intuitive.

IBM and OS/2 are registered trademarks and Workplace Shell, CommonView, C Set/2, "Operate at a higher level" and OS/2 Crash Protection are trademarks of International Business Machines Corporation. All other products are trademarks or registered trademarks of their respective companies. © 1993 IBM Corp.

Introducing Version 2.1



arrested velopment.”

your computer screen. And should you need assistance with anything, IBM's Worldwide Developer Assistance Program is always there to help.

Now available on CD-ROM.

Use OS/2 to increase productivity of DOS, Windows and OS/2 application development.

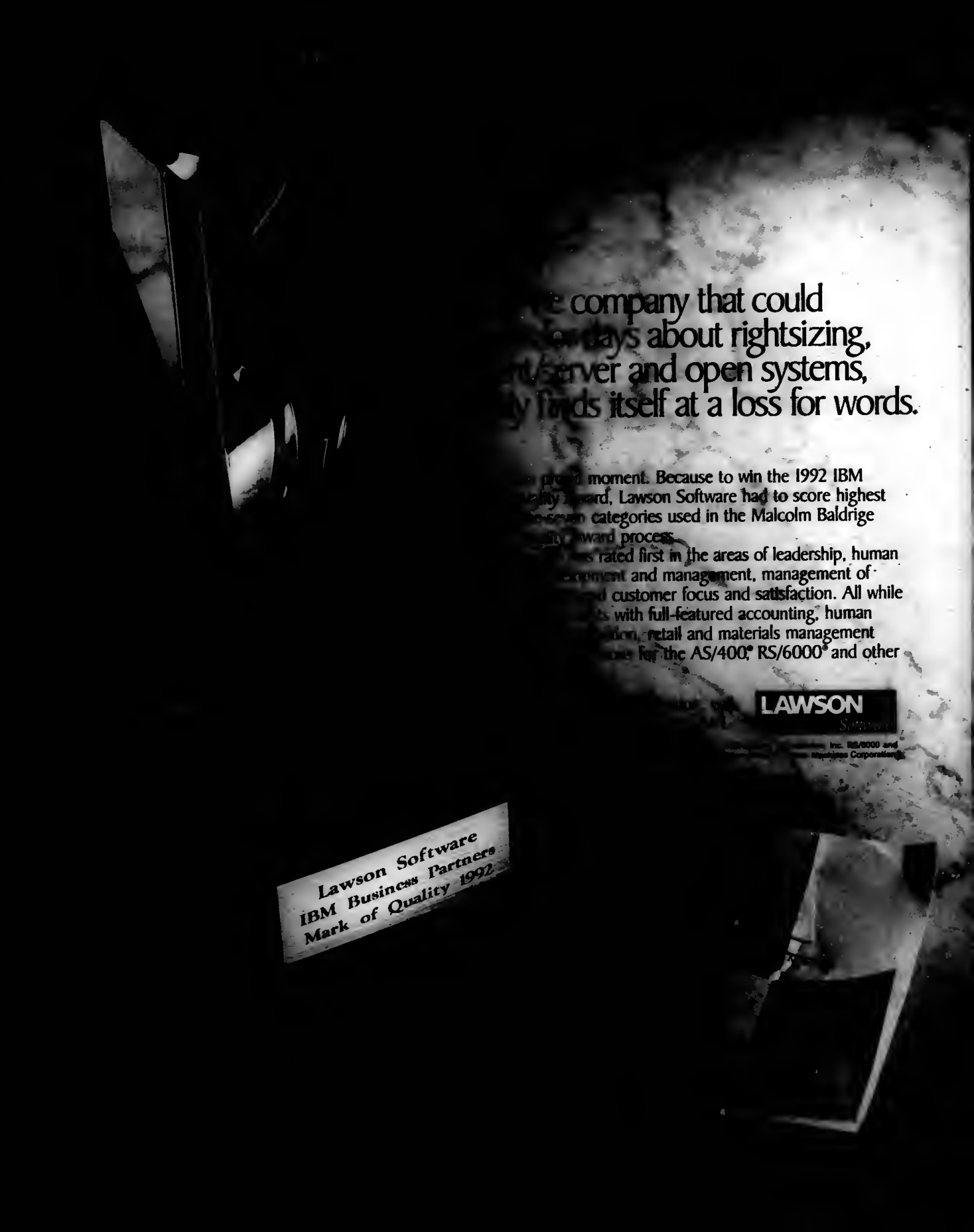
With OS/2's 32-bit architecture, you can push your 386 and 486 hardware to the limit, and develop spectacular enterprise-wide client-server and multimedia applications. In fact, OS/2 2.1 has superior multimedia support, as well as increased support for CD-ROM, PCMCIA and pen technologies. Here's your chance to develop truly revolutionary 32-bit applications. With OS/2, now there's nothing stopping you.

1992
- WINNER -
PC Magazine Award
for Technical Excellence
PC MAGAZINE
OPERATING SYSTEMS AND SOFTWARE STANDARDS
OS/2, Version 2.0
IBM Corporation

To learn more, call 1 407 982-6408 now, and get a free white paper on why OS/2 is the ideal platform for your development efforts.

Operate at a higher level.™

IBM


company that could
days about rightsizing,
server and open systems,
ds itself at a loss for words.
moment. Because to win the 1992 IBM
rd, Lawson Software had to score highest
categories used in the Malcolm Baldrige
ward process.
rated first in the areas of leadership, human
ment and management, management of
customer focus and satisfaction. All while
with full-featured accounting, human
retail and materials management
for the AS/400, RS/6000 and other
LAWSON
Lawson Software
IBM Business Partners
Mark of Quality 1992

Take a slice off the price of Computerworld.

51 issues for only ~~$48~~. *Now only $42.95*

❑ Save me a slice. I accept your offer of $42.95* for 51 issues, a savings of over $5.00 off the basic subscription price of $48.

First Name MI Last Name

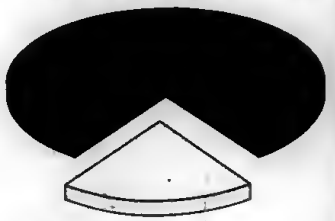
Title Company

Address

City State Zip

Address Shown ❑ Home ❑ Business ❑ New ❑ Renew Basic rate $48 per year

* U.S. Only. Canada $74.97, Central/South America $130, Europe $195, all other countries $295.
Foreign orders must be pre-paid in U.S. dollars.



Please answer the questions below in order to qualify for this offer.

1. BUSINESS/INDUSTRY (Circle one)
- 10 Manufacturer (other than computer)
- 20 Finance/Insurance/Real Estate
- 30 Medical/Law/Education
- 40 Wholesale/Retail/Trade
- 50 Business Service (except DP)
- 60 Government - State/Federal/Local
- 65 Communications Systems/Public Utilities/ Transportation
- 70 Mining/Construction/Petroleum/Refining/Agric.
- 80 Manufacturer of Computers, Computer-Related Systems or Peripherals
- 85 Systems Integrators, VARs, Computer Service Bureaus, Software Planning & Consulting Services
- 90 Computer/Peripheral Dealer/Dist./ Retailer
- 95 Other_____ (Please Specify)

2. TITLE/FUNCTION (Circle one)

IS/MIS/DP MANAGEMENT
- 19 Chief Information Officer/Vice President/ Asst. VP IS/MIS/DP Management
- 21 Dir./Mgr. MIS Services, Information Center
- 22 Dir./Mgr. Tech. Planning, Adm. Svcs., Data Comm. Network Sys. Mgt., LAN Mgr., PC Mgr.
- 23 Dir./Mgr. Sys. Development, Sys. Architecture
- 31 Programming Management, Software Developers
- 41 Engineering, Scientific, R&D, Tech. Mgt.
- 60 Sys. Integrators/VARs/Consulting Mgt.

CORPORATE MANAGEMENT
- 11 President, Owner/Partner, General Mgr.
- 12 Vice President, Asst. VP
- 13 Treasurer, Controller, Financial Officer

DEPARTMENTAL MANAGEMENT
- 51 Sales & Mktg. Management
- 70 Medical, Legal, Accounting Mgt.

OTHER PROFESSIONAL MANAGEMENT
- 80 Educator, Journalists, Librarians, Students
- 90 Other Titled Personnel

3. Are you involved in the purchase or use of the following: (Circle all that apply.)
- a. Networking/Communication Equipment
- b. PCs/Workstations
- c. Large Scale/Midrange Systems
- d. Software
- e. Peripherals

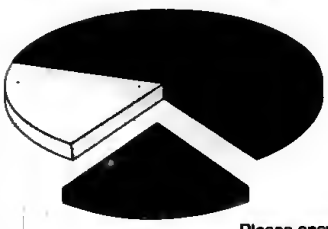
E4324-1

COMPUTERWORLD

Take a slice off the price of Computerworld.

51 issues for only ~~$48~~. *Now only $42.95*

❑ Save me a slice. I accept your offer of $42.95* for 51 issues, a savings of over $5.00 off the basic subscription price of $48.



First Name MI Last Name

Title Company

Address

City State Zip

Address Shown ❑ Home ❑ Business ❑ New ❑ Renew Basic rate $48 per year

* U.S. Only. Canada $74.97, Central/South America $130, Europe $195, all other countries $295.
Foreign orders must be pre-paid in U.S. dollars.

Please answer the questions below in order to qualify for this offer.

1. BUSINESS/INDUSTRY (Circle one)
- 10 Manufacturer (other than computer)
- 20 Finance/Insurance/Real Estate
- 30 Medical/Law/Education
- 40 Wholesale/Retail/Trade
- 50 Business Service (except DP)
- 60 Government - State/Federal/Local
- 65 Communications Systems/Public Utilities/ Transportation
- 70 Mining/Construction/Petroleum/Refining/Agric.
- 80 Manufacturer of Computers, Computer-Related Systems or Peripherals
- 85 Systems Integrators, VARs, Computer Service Bureaus, Software Planning & Consulting Services
- 90 Computer/Peripheral Dealer/Dist./ Retailer
- 95 Other_____ (Please Specify)

2. TITLE/FUNCTION (Circle one)

IS/MIS/DP MANAGEMENT
- 19 Chief Information Officer/Vice President/ Asst. VP IS/MIS/DP Management
- 21 Dir./Mgr. MIS Services, Information Center
- 22 Dir./Mgr. Tech. Planning, Adm. Svcs., Data Comm. Network Sys. Mgt., LAN Mgr., PC Mgr.
- 23 Dir./Mgr. Sys. Development, Sys. Architecture
- 31 Programming Management, Software Developers
- 41 Engineering, Scientific, R&D, Tech. Mgt.
- 60 Sys. Integrators/VARs/Consulting Mgt.

CORPORATE MANAGEMENT
- 11 President, Owner/Partner, General Mgt.
- 12 Vice President, Asst. VP
- 13 Treasurer, Controller, Financial Officer

DEPARTMENTAL MANAGEMENT
- 51 Sales & Mktg. Management
- 70 Medical, Legal, Accounting Mgt.

OTHER PROFESSIONAL MANAGEMENT
- 80 Educator, Journalists, Librarians, Students
- 90 Other Titled Personnel

3. Are you involved in the purchase or use of the following: (Circle all that apply.)
- a. Networking/Communication Equipment
- b. PCs/Workstations
- c. Large Scale/Midrange Systems
- d. Software
- e. Peripherals

E4324-1

COMPUTERWORLD

NO POSTAGE
NECESSARY
IF MAILED
IN THE UNITED
STATES

BUSINESS REPLY MAIL
FIRST CLASS MAIL PERMIT NO. 55 MARION, OH 43306

POSTAGE WILL BE PAID BY ADDRESSEE

COMPUTERWORLD

PO BOX 2044
MARION OHIO 43306-2144

NO POSTAGE
NECESSARY
IF MAILED
IN THE UNITED
STATES

BUSINESS REPLY MAIL
FIRST CLASS MAIL PERMIT NO. 55 MARION, OH 43306

POSTAGE WILL BE PAID BY ADDRESSEE

COMPUTERWORLD

P.O. BOX 2044
MARION, OHIO 43306-2144

Displaying the future

Quest for larger, more vivid screens drives development of display technologies

By Ellis Booker

Start with a silicon wafer outfitted with 307,200 tiny, movable aluminum mirrors. Next, aim a light source at this surface and precisely tilt each "micro-mirror" to control each pixel on the screen.

Voila! A thoroughly digital projection display — unmediated by either a CRT or an LCD.

Texas Instruments, Inc.'s prototype digital micro-mirror device (DMD) projection display was one of several next-generation systems discussed at last month's Society of Information Display conference in Seattle.

"The original work on this technology was done at Westinghouse in the '70s," said Frederic J. Kahn of Kahn International, a Palo Alto, Calif., consultancy specializing in projection and flat-panel displays.

According to Kahn, TI's decade worth of work seems to have paid off. DMD "is starting to look very much like a commercial product," he said.

Kahn also said TI's effort points to an exciting trend in the display industry: that of using a single fabrication technology to make a display device and its associated electronics. "In standard [flat] panels, you make the display part with one technology and the chips with another. Then you bond them together," he explained. Taken together, he said, these various processes make screens expensive.

Projection displays *may someday make CRTs and LCDs obsolete. Research on display technology is being fueled by a need for larger screens, particularly for high-definition television.*

Manufacturers of displays are also pushing to make systems larger and more vivid.

Key to this quest for bigger screens is a variety of flat-panel display technologies because a conventional CRT monitor larger than 40 inches would weigh well over 200 pounds.

At the display conference, for instance, Tokyo's Science and Technology Research Labs presented a paper on its experimental 40-in. diagonal, color plasma flat-panel display. The vendor is reportedly working on a 55-in. color plasma panel (see story below).

The TI projection prototype uses video from an unmodified National TV Standards Committee video source. In operation, the video signal is separated into its red, green and blue (RGB) components. Filtered light (red, green, blue) shines onto the chip and its mirrors, the movements of which are coordinated by the digitized RGB video signal.

Colorful variety

Capable of displaying 16 million possible colors, the TI display offers 640- by 480-pixel resolution, a contrast ratio of 50-to-1 and an aspect ratio of 4-to-3. This makes it comparable in quality to the best projection displays now available. TI's prototype projection system sends images up to 12 feet away to a 60-in. diagonal screen.

TI said both the electronics and the 17-micron square mirrors on its DMD chip — technically known as a "pixelated, micromechanical spatial light modulator" — are created using standard .80-micron CMOS semiconductor fabrication gear. This semiconductor-based design, according to TI, is more cost-effective than conventional alternatives and might someday be a low-cost way to manufacture high-definition television monitors.

Plethora of panels

Alternatives to the CRT have proliferated as fast as bad cartoons on Saturday mornings.

Flat-panel display technologies continue to receive enormous sums of R&D dollars, although manufacturers have encountered nagging technical and manufacturing problems that have made them somewhat less bullish on these technologies than just a few years ago.

The appeal of flat panels is twofold. First, they are the logical choice for portable devices. Until now, this has meant portable computers, but the dawning era of the personal communicator and personal digital assistant is expected to expand this opportunity. Second, several vendors are experimenting with flat panels for large (36-in. and above), high-definition television (HDTV) screens.

The total market for flat displays will grow from $8.7 billion this year to $4.8 billion in 1995 and to $6.8 billion in 1997, according to Stanford Resources, Inc. in San Jose, Calif. Of this, computers will account for $1.9 billion, $2.5 billion and $3.5 billion, respectively.

Flat-panel displays include the following:

▶ Passive-matrix LCDs, also known as supertwist nematic displays. A multiplexing scheme is used to control individual rows of pixels, with a transistor at the end of each row and column. This approach means voltage at each individual pixel cannot be controlled as precisely as with thin-film technology. Advancements are occurring in passive-matrix LCDs, however. One vendor, in Focus Systems, Inc. in Tualatin, Ore., has developed what it calls "active addressing," a technology to improve the viewing angle and response time of these screens.

▶ Thin-film technology (TFT) LCDs, also known as active-matrix LCDs. Each pixel has its own transistor or diode. Color TFT LCDs are created by adding three "sub-pixels" to this scheme. The focus of most of the R&D spending in the flat-panel industry, TFT LCDs will come to dominate the portable computer market, according to most observers. But relatively high failure rates in the manufacturing of these screens makes them more expensive than current passive-matrix screens. In addition, several firms are working on desktop and workstation versions of TFT screens. Sharp Ltd., for example, is readying the commercial release of a 17-in., 1,280- by 1,024-pixel TFT LCD for workstations.

▶ Plasma display panels. Plasma panels use ionized gases, such as neon or argon, that glow when exposed to a voltage. This basic display structure, if topped with different phosphors, can also support color. Color plasma systems have been shown by a few vendors, including Fujitsu Ltd., which is now shipping the first production color systems, a 21-in. diagonal display. Plasma panels are of keen interest to backers of HDTV systems because they can support large (36-in. and above) screens.

▶ Ferroelectric LCDs. The key attribute of these LCDs is their ability to remember the contrast level at each pixel without being refreshed with voltage. Difficult to make larger and slower than competing technologies, these LCDs have trouble doing real-time video.

▶ Electroluminescence (EL) displays. These displays use a three-layer structure: an active layer of phosphor material layered between two dielectric layers. Unlike plasma and LCD displays, EL screens are solid-state devices. Last month, the leading EL vendor in the U.S., Planar Systems, Inc. in Beaverton, Ore., demonstrated a color prototype.

▶ Field-emission displays (FEDs). The most experimental of all types of flat panels, FEDs operate similarly to CRTs, except that instead of a single electron gun per monitor, an FED uses many micron-size, metallic tips as the electron beam source. Backers say FEDs will yield only 50% of the power of TFT LCDs. — Ellis Booker

8:00 Home *Over breakfast, you check your calendar on your PowerBook Duo. The day looks like it'll be a breeze. You'll put a few finishing touches on the Q2 forecast presentation that's due in a couple of days, return a few calls, and have a free afternoon (for a change).*

9:15 Your Office *You slide your PowerBook Duo into the Duo Dock and start working. Suddenly, your e-mail chimes. Your boss wants you on the noon shuttle to Boston, to present the Q2 forecast to his boss. Also, a client wants to see you ASAP. You hit the eject button and go.*

2:50 Borrowed Office *A colleague is at lunch, so you borrow his Duo Dock. You log onto e-mail back at the home office and learn your group has just won a new piece of business. You incorporate this news into your presentation (and change a few colors while you're at it).*

3:30 Conference Room *You clip on the Duo MiniDock and run the presentation from your PowerBook Duo. Everybody's impressed -- especially the guy who asks you a series of tough questions about a six-month-old project. You've got all your files, so you've got all the answers.*

No other computer could get

For years, you've been trying to keep up with computers. Now there's a computer that can actually keep up with you: the Apple® PowerBook Duo™ System.

It's nothing less than the most flexible, adaptable and personal computer in the world.

On the road, it's a slim, sleek and powerful notebook computer.

Model	PowerBook Duo 210	PowerBook Duo 230
Weight	*4.2 pounds*	*4.2 pounds*
Memory	*4MB exp. to 24MB*	*4MB exp. to 24MB*
Storage	*80MB*	*80MB or 120MB*
Display	*9-inch backlit*	*9-inch backlit*
Battery	*Up to 4.5 hours*	*Up to 4.5 hours*
Speed	*25 MHz 68030*	*33 MHz 68030*

In the office, when plugged into a Duo Dock, it instantly becomes a fully expandable, no-compromise desktop computer that lets you work with a full-size keyboard and up to a 16-inch color monitor.

But what really sets the PowerBook Duo System apart from conventional docking systems is a bit of engineering genius called PowerLatch™ technology. A combination of elegant hardware and intelligent software that

© 1993 Apple Computer, Inc. All rights reserved. Apple, the Apple logo, Macintosh and "The power to be your best" are registered trademarks of Apple Computer, Inc. PowerBook, PowerBook Duo and PowerLatch are trademarks of Apple Computer, Inc. Persuasion is a registered trademark of Aldus Corporation. QuickMail is a trademark of CE Software, Inc.

11:10 Your Client's Office *That $5 million project the client told you was off last week? It's on again. And due in two weeks. You type up a few job orders, which you'll fax from your PowerBook when you get to Boston. Now, however, you have to catch a cab for the airport.*

12:40 Noon Shuttle *All the files and software you use at your desktop are right here with you. You pull up the Q2 presentation and make the revisions to reflect the new assignment. Then you write a quick memo to your team, to make sure that everything's on schedule.*

7:00 Your Office *On the way home, you swing by the office to tie up a few loose ends. You see your boss. He heard the meeting went extremely well, and wants you to fly out and present to the people in London. Tomorrow. You send out a quick memo to update your staff.*

8:30 Living Room *Since you've got all your files and software right there with you, you could write a report, study the new research data or finish up those performance reviews. But hey, enough is enough. You settle back in your recliner and play a few rounds of Tetris.*

you through a day like this.

lets you move in and out of the office with tremendous ease.

There are no cables to fiddle with and no complicated "reconfiguring" procedures. Just slip the PowerBook Duo into the Duo Dock, and the system automatically recognizes all your networking resources and attached peripherals.

Simply push a button, and a motor gently releases the PowerBook Duo. (It will remind you to save any unsaved files, in case you forget.) Now, wherever you go, your files go with you. You can even add an optional PowerBook Express Modem, to let you send and receive documents while you're on the road.

To experience the PowerBook Duo System for yourself, call 800-732-3131, extension 100, for the name of the authorized Apple reseller located nearest you. (If you're in Canada, call 800-665-2775, extension 910.) And no matter how dramatically things may change in your life, at least you'll always have the one power you can depend on. The power to be your best.®

PowerBook Duo from Apple

Tetris is a trademark of Elorg, Inc. This ad was created using Macintosh desktop and Apple PowerBook personal computers.

IT's coming

For years, the world has been fed the information technology "productivity paradox" wherein huge investments in information technology were labeled as productivity-impotent. "There is no increase in productivity, despite what's been spent," cried the high priests of economic thought.

Suddenly, the tunes they are a changin'. I don't know when the change began, but I think I know why.

First, Intel Chairman Andy Grove told *Wall Street Journal* readers a few months ago that returns on information technology investments are nigh! They will come as a result of all the wonderful and heretofore unheard of applications that will grow out of the emerging networked PC world. What better reason do you need to go out and order a few pallets of Pentium-based machines? (My editorial interpretatioo here.)

Then, *BusinessWeek*'s cover trumpeted the "productivity payoff" from information technology. Yes, it's finally arriving. Thank God for the wonderful networked LAN environment, bringing information to everyone's fingertips and real productivity to the workplace.

Recently *Computerworld*, too, published a study that heralded significant gains from the deployment of information technology. Have users somehow unlocked the riddle of the productivity paradox?

Before we let the latest wave of hysteria turn off the few remaining lights of reason, let's examine the issue. Consultants and information technology academics profit when there are issues they can consult on or write about. Scores of them will now write and consult on the new productivity payoff theorem. Forget about the bald fact that advocates of LAN-based systems have not even begun to detail the real costs of this deployment. There's consulting money to be made!

Also, consider whether there ever was any productivity paradox to begin with. *Computerworld* has surveyed top CEOs and CFOs in three studies over five years, and in each study, a very consistent 75% of the sample answered "yes" to the question, "Are the benefits of information technology investments quantifiable?" Yet when we asked them how they measure those benefits, the executives said they resort largely to soft measures such as user satisfactioo and perceptions of whether projects are completed on time.

That's because despite years of trying, some of the best and brightest minds in the world simply can't derive unimpeachable productivity return formulas for information technology investments.

Furthermore, no productivity input, like information technology, is an island unto itself. You simply cannot strip information technology out of a bubbling caldron of corporate economic activity and gauge how much flavor information technology alone adds to the broth. It's just not that simple.

So brace yourself for exaggerated reports of yet another paradigm shift. At least this one is inherently more upbeat than the last, as long as no one peeks at the man behind the curtain.

Bill Laberis

Bill Laberis, *Editor in chief*

Why worry?

Stop worrying about the Clipper chip and Big Brother ["Clipper gives Big Brother far too much power," *CW*, May 31].

No one is going to use it except contractors who are required to so they can have "unclassified, sensitive" telephone conversations with Defense Department agencies. Anyone who is paying attention, and really wants secrecy, won't use this precompromised crypto system.

The ostensible purpose of the Clipper chip is to let the FBI listen in on telephone conversations between drug lords. This is a goofy idea.

Is it reasonable to assume that AT&T is not going to warn Clipper telephone buyers? No sale, and fade out to sounds of laughter.

Robert F. Jacobson
New York

Doctor's orders

In "Health care data network fires up" [CW, May 24], the assistant vice president of EDI services at Blue Cross/Blue Shield of Louisiana and Mississippi said: "The same doctor who will spend $50,000 on a Mercedes won't spend $4,000 on systems because the car is a symbol of being a doctor and the computer is a symbol of being a businessman."

As a physician who has been intimately associated with the computer industry for more than 15 years, this type of thinking is symptomatic of what has been wrong with the industry's approach to users in general and physicians in particular.

The vast majority of vendors have rarely involved the doctor in system development. The IS industry still caters to the medical school gurus, the small-focus researchers and especially to the "businesspeople" in the health industry who sign the checks.

The emphasis seems to be on "bells and whistles" instead of meeting the needs of the practicing physician.

The needs of physician osers are too important to be entrusted solely to the insular thinkers of the information industry. Come down into the trenches and ask the doctors what they really want and oeed from automation.

J. E. Goldberg, M.D.
Tulsa, Okla.

NCR neglect

Although *Computerworld* acknowledged NCR's entry into the Peotium arena in the May 10 issoe, "It's almost show time for Pentium," the piece that ran on the day of NCR's and other Pentium announcements, "Pentium dearth slows system delivery" [CW, May 17], was suspiciously void of any NCR mention. This oversight appears to be inexplicable.

NCR's prodocts were Intel's demo systems of choice for its initial Pentium launch in March.

What's more, the NCR 3360 is one of the very few systems that will ship in volume in June. This factor alone makes our product noteworthy.

And finally, early feedback and reviews from several prominent publications indicate that "NCR's Pentium-based machines may span the widest range" and that the System 3360 is the "fastest single-user machine that can run Windows today" and "an extraordinary machine by any measure."

When a vendor or product is clearly delivering a compelling advantage and unique value to its users, its absence in a roundup article is a disservice to all your readers.

Shary Hauer
Workstation Products Division
NCR Corp.
Dayton, Ohio

Fight insight

I want to commend you oo your editorial "Fighting back" [CW, April 26].

The Society for Informatioo Management is committed to providing international leadership in information technology to achieve business objectives. Software licensing is just the first area we intend to address vigorously.

We appreciate *Computerworld*'s fair and open coverage of our position on software licensing.

Robert M. Rubin
Elf Atochem North America, Inc.
Philadelphia

■ COMPUTERWORLD WELCOMES COMMENTS FROM ITS READERS. LETTERS MAY BE EDITED FOR BREVITY AND CLARITY AND SHOULD BE ADDRESSED TO BILL LABERIS, EDITOR IN CHIEF, COMPUTERWORLD, P.O. BOX 9171, 375 COCHITUATE ROAD, FRAMINGHAM, MASS. 01701. FAX NUMBER: (508) 875-8931; MCI MAIL: COMPUTERWORLD. PLEASE INCLUDE A PHONE NUMBER FOR VERIFICATION.

COMPUTERWORLD

Editor in Chief
Bill Laberis
Executive Editor
Paul Gillin

News Editor
Alan Alper
Technical Sections Editor
James Connolly
Assistant News Editor
Patricia Keefe
Technical Editor
Charles Babcock
Senior Editors
Elisabeth Horwitt
Networking
Rosemary Cafasso
Corporate Strategies
Neil Margolis
Management
Joanie M. Wexler
Networking
Johanna Ambrosio
Systems & Software
Garry N. Ray
Application Development
Ellis Booker
Advanced Technology
Michael Vizard
Personal Computing
Craig Stedman
Midrange Systems
Senior Writers
Michael Fitzgerald
Melinda-Carol Ballou
Staff Writers
Lynda Radosevich
Stephen P. Kiett Jr.
New Products Writer
Lisa Davidson
Features Editor
Joanne Kelleher
Senior Editors
Joseph Maglitta, Management
Lory Zottola Dix, In Depth
Mary Brandel, CW Guide
Joyce Chutchian-Ferranti, Integration Strategies
Associate Editors
Carol Hildebrand, Management
Jodie Haze, Marketplace and Careers
Assistant Editor
Derek Slater
Assistant Researcher
Stefanie McCann, CW Guide
Intern
Erin Calloway
Research Manager
Michael L. Sullivan-Trainor
Research Coordinator
Kevin Burden
Chief Copy Editor
Catherine Gagnon
Assistant Chief Copy Editor
Anne McCrory
Features Copy Editors
Kimberlee A. Smith
Steven J. Condon
Copy Editors
Alice Leach Kelly
Christina Alcardi Maguire
Jill Zolot
Ellen Fanning
Design Director
Nancy Kowal
Senior Graphic Designer
Tom Monahan
Design Assistant
Janell Genovese
Graphics Specialists
Michael Siggins
Stephanie Faucher
Cartoonist
Rich Tennant
Office Manager
Linda Gorgone
Editorial Assistants
Lorraine Wrizell-
Connie Brown
Aleksandra Skulte
Rights and Permissions Manager
Sharon Bryant
Computerworld's Client/Server Journal
Maryfran Johnson, Editor
News Bureaus
Mid-Atlantic
Thomas Hoffman, Correspondent
(201)967-1350
Washington, D.C.
Mitch Betts, National Correspondent
(202) 347-6718
Gary H. Anthes, Senior Correspondent
(202)347-0134
West Coast
(415) 347-0555
Jean S. Bozman
Senior West Coast Editor
James Daly
Mark Halger
Senior Correspondents
Christopher Lindquist
Kim S. Nash
Correspondents
Chris Flanagan, Editorial Assistant
Michele Desizet, Correspondent
(801) 328-2425
Midwest
Ellis Booker, Bureau Chief
(708) 827-4433
Main Editorial Office
Box 9171, 375 Cochituate Road
Framingham, Mass. 01701-9171
(508) 879-0700
MCI Mail: 279-6273
CompuServe: 76537,2413
Subscriptions. (800) 669-1002

Don't talk to me about paradigms

Michael Cohn

If you've heard them once, you've heard them a thousand times. These are the tired, trite, overused terms that make your skin crawl. While IS buzzwords come and go, these can't go fast enough. Each time someone uses one, you get the desperate urge to club the person with a keyboard.

▶ **Paradigm.** This is the favorite word of IS consultants. They love to blame everything on paradigms. They claim we can't see, hear or move because of paradigms.

I'd like to pummel the next person who says "paradigm." How can IS people have paradigms? Most days we don't even have lunch. Maybe we've missed the boat a time or two. But anyone would have trouble seeing, hearing and moving if they had beepers blasting in their ears and a couple hundred users on their back 24 hours a day.

▶ **Total quality management.** Having the words "quality" and "management" in the same phrase is scary enough, but "total" sounds arrogant to me. Let's be realistic: The only time you hear "total" in IS is when someone is complaining about a "total mess." Would anyone settle for "partial quality management"? Or "occasional quality management"? That we could probably manage.

▶ **Integration.** By now, businesses expect all their systems to be integrated, and IS is ready to help. We're planning to get all these platforms to work together — as soon as we figure out how to get the stuff to work by itself.

Jamie Zawinski

▶ **Infrastructure.** This is the big one, the most popular buzzword of the '90s. IS folks pontificate at power lunches about network infrastructure, staff infrastructure, management infrastructure or any other infrastructures they can think of.

Don't waste your time with infrastructures. You can't build one. You can't buy one. Sure, it would be nice to mold your organization into a flexible, future-oriented team of skilled professionals, and maybe that would qualify as "infrastructure." But, more likely, you'll end up moving a bunch of desks around, calling too many meetings and creating something a lot more like "intra-fracture."

▶ **World class.** I am everlastingly sick of the phrase "world class" — world-class IS department, world-class service organization. What does it take to be world-class anyway? I bet it requires a whole lot of infrastructures and total quality management.

▶ **System re-engineering.** Don't be fooled by this one. We never "engineered" these systems in the first place. Once they were compiled, we slammed them into production and called it a day. On second thought, let's not mess with this term. Your CFO can probably handle system re-engineering, but he might balk if you told it like it is and tried to sell the idea of "system re-winging it."

▶ **Client/server.** This is the most misunderstood term in IS. People used to define client/server as everything that wasn't a mainframe. Then someone came up with the idea that mainframes could be servers, or even clients, of some really pushy PC.

So let me give you my definition. Client/server is a simple, three-step process:

Step 1: Something tries to send some data.

Step 2: Something else tries to receive some data.

Step 3: The alleged data disappears somewhere in the middle, a bunch of beepers start to go off, and nobody gets a good night's sleep.

Cohn works for an integrated, world-class infrastructure in Atlanta.

Flip, flop; flip, flop – let's think about a compromise

LISTEN UP! *by* Elaine Bond

It is time to get off the pendulum ride that has many of us swinging back and forth between wholesale decentralization and recentralization.

These pendulum swings are knee-jerk reactions to the perception that the IS function isn't working. In the absence of any clear idea of what is wrong, companies hope a reorganization will make it work better. The hoped-for improvement seldom materializes, however, because decentralizaton is implemented in naive, radical ways that ensure cost escalation, redundancy and confusion.

The arguments offered in support of decentralization are usually something like this:

IS is a function like any other and should be treated as such. The business or functional unit heads should be accountable and responsible for their own needs. As the people closest to the action, they have the best view of what's needed and are best able to calculate tradeoffs between investment in IS and investment in other functions within their units.

The implication of this reasoning is that centralized IS groups are neither as efficient nor as effective as decentralized groups and that business unit management can do as good a job managing the function as an IS manager can, and that decentralized groups will spend less to get more/better results sooner.

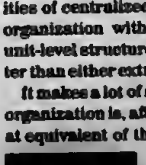
My experience is that some of this may be true in the early days of decentralization, but the benefits dissipate quickly and the warts inherent in decentralized organizations begin to appear. Here are some of the often-overlooked defects of decentralized organizations:

- **Loss of budget oversight:** Contention over IS issues becomes less visible to the most senior levels of management. This may seem like good news to top managers who feel they have enough to worry about dealing with budget allocations for units, let alone functions. It can be very bad news, however, if a unit is either underfunding the function or wasting resources.
- **Cost escalation:** The total cost to the corporation for IS almost always rises after decentralization.
- **Hidden problems:** There will be application development failures and service-level issues, but they will be less visible. Business unit heads won't turn themselves in or even ask for help from outside groups until there is a disaster or unless the auditors turn them in. Failures aren't reduced, just hidden.
- **Balkanization:** Technology choices at the business-unit level are frequently suboptimized and incompatible with other units' choices. This is not a problem unless or until you try to move information across units or integrate or reorganize business units at some later point.

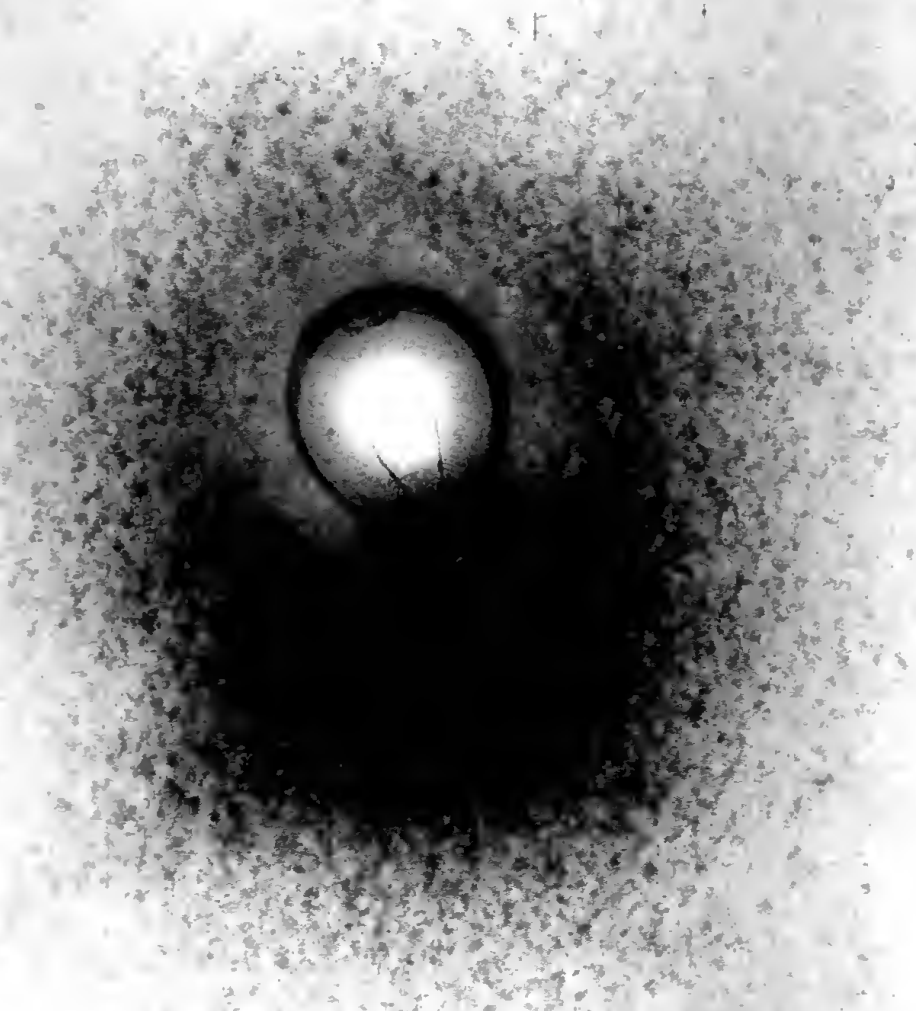
Does this mean decentralization is not effective? No, just that it isn't a panacea and that IS is still enough of a specialty area to require corporate-level guidance and governance.

Reapportioning the roles and responsibilities of centralized IS groups into a matrixed organization with corporate- and business-unit-level structures can and should work better than either extreme.

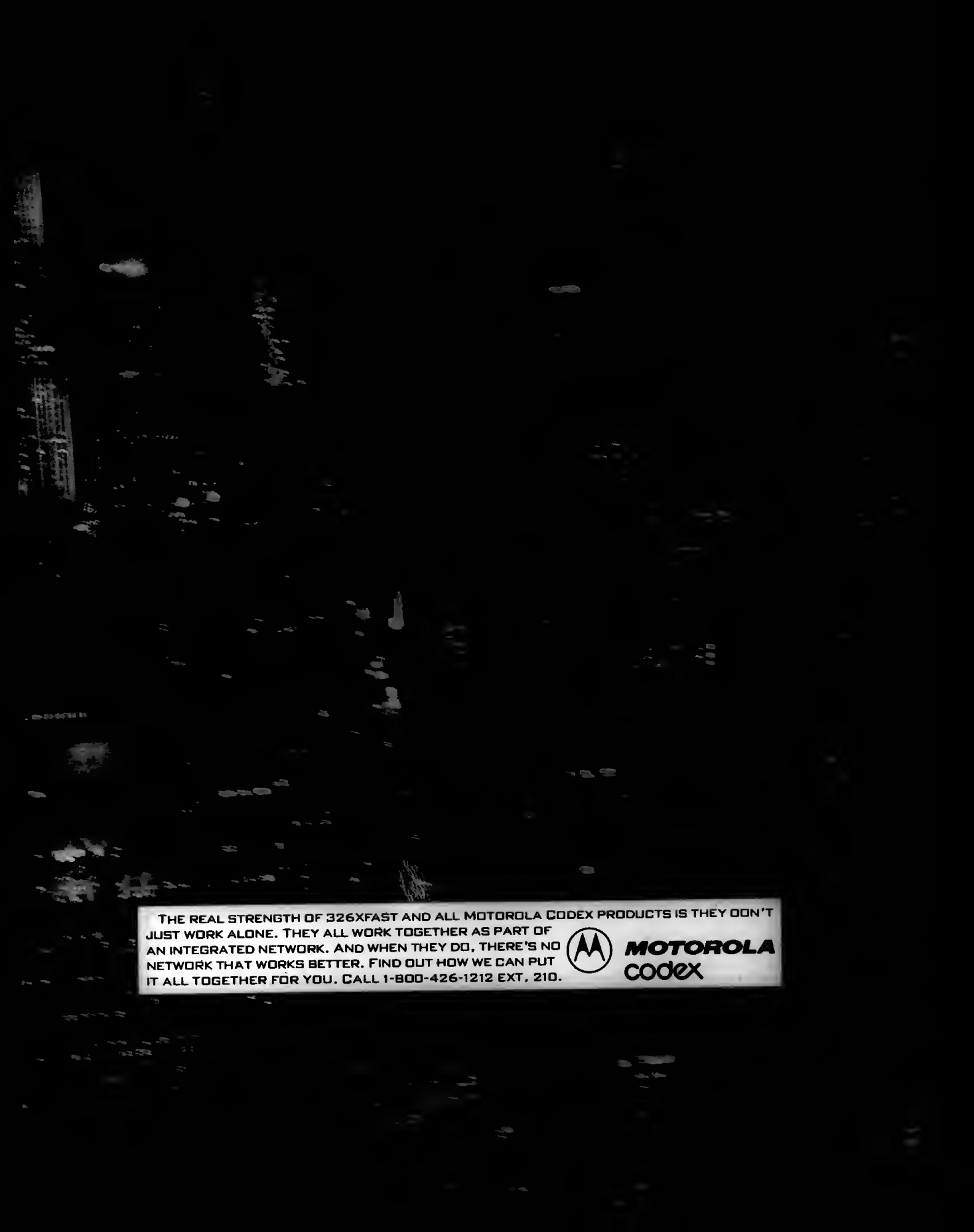
It makes a lot of sense. This kind of matrixed organization is, after all, just the organizational equivalent of the kind of technology structure we're all trying to put in place — highly distributed, networked computing, based on a well-defined but flexible architecture capable of accommodating plug-and-play components.



Bond is a Chase fellow and senior technology consultant at The Chase Manhattan Bank N.A. She is a founder of the recently formed user advocacy group Open User Recommended Solutions (OURS).



Corporate brand names are the properties of the listed companies. © 1993 Motorola Inc. Motorola, Ⓜ, Codex are trademarks of Motorola Inc.


THE REAL STRENGTH OF 326XFAST AND ALL MOTOROLA CODEX PRODUCTS IS THEY DON'T JUST WORK ALONE. THEY ALL WORK TOGETHER AS PART OF AN INTEGRATED NETWORK. AND WHEN THEY DO, THERE'S NO NETWORK THAT WORKS BETTER. FIND OUT HOW WE CAN PUT IT ALL TOGETHER FOR YOU. CALL 1-800-426-1212 EXT. 210.
MOTOROLA
codex

HERE'S HOW OUR TOKEN RING PRODUCTS STACK UP TO THE COMPETITION'S.

Stack us up to any other major hub vendor, and see for yourself. Cabletron offers more Token Ring modules for the intelligent hub than the competition. Period.

But that's only the beginning.

Our Token Ring products are driven by Intel's high-performance i960 32-bit RISC processor. The competition's? 16 bits. Our active Token Ring modules provide up to 24 ports. The other guy's? Half that. And we have an integrated solution for bridging Ethernet, Token Ring and Wide Area Networks with a single module. Their solution? A stand-alone box.

Our products use Flash EEPROM for easy upgradeability. Theirs don't. Our Desktop Network Interface Cards support both STP and UTP and provide *at-a-glance* diagnostics. Theirs won't. And we've integrated twelve station ports on a single, manageable repeater module with Ring-In/Ring-Out capabilities for both fiber and copper. They can't.

With 19 modules for our MMAC hub, Cabletron's Token Ring solution is "the complete solution." Theirs? Well, they simply don't stack up.

For more information on Cabletron's Complete Token Ring Solution, give us a call at (603) 332-9400, Ext. 2705. And ask for your free copy of Cabletron's *SNA and Token Ring Integration Strategy*, the white paper that maps out a smooth migration to the "new" SNA and integrated SNA/Token Ring environments.

"To support new services to our subscribers, we at Blue Cross Blue Shield of Connecticut have embarked on an expansion project that will take us from 250 workstations to almost 2000! We found that Cabletron had the most complete line of Token Ring products and the technical support to assist us in designing and implementing the network that was right for us."

Graham Morrison
Network Design & Engineering
Blue Cross Blue Shield

CABLETRON SYSTEMS Inc.
Token Ring
The Complete Networking Solution™

Corporate Headquarters 35 Industrial Way, P.O. Box 5005, Rochester, NH 03867-0505

Charles Babcock

Shifting down

The appetite for data on the desktop is growing voraciously. In some cases, the sheer size and scope of applications that departments want to run is growing to near-mainframe proportions.

If an oil exploration unit wants to analyze seismic data, will it be frustrated by the 4G-byte address limit of its 32-bit systems? Will it wait in line for a small piece of someone else's supercomputer time, or will it look for a new breed of server that can push gigabytes of information through a high-bandwidth processor?

Since the mid-1970s, the supercomputer has been as remote from the desktop as the Siberian tiger. It might still appear that these two styles of computing are destined to remain worlds apart, but developments at Cray Research indicate a rapprochement — if not an outright intersection — could occur this year.

Cray is no longer simply creating a few very large locomotives like the Cray Y-MP C90, a 16-processor, $30 million machine. In an age of commodity computing, Cray is sticking to its large system concepts but is seeking to repackage them in smaller units that are closer to the desktop and presumably less expensive.

Although it still designs its own logic chips for the Y-MP line, Cray is about to launch two product lines that make use of CPUs from chip suppliers. However, this is not a plan to make Lego block supercomputers, assembling a big machine out of small, look-alike PC components. Cray spokesmen will tell you that prospect is inhibited by the severe I/O constraint designed into an Intel chip.

Rather, Cray will tap SPARC chips to come up with a superserver to sit atop the Sun Microsystems product line, and it will use DEC's Alpha chip to produce a massively parallel computer. Both product lines are due to appear before the end of the year.

The SPARC-based units, known internally as the "Super dragon" SMP line, represent an effort to broaden Cray's customer base, although its "mass appeal" will amount to a few hundred, not thousand, units, Cray said.

On the second front, massively parallel processing (MPP) systems have seldom lived up to their promise in sustained throughput. Cray views the creation of an MPP architecture as a much greater challenge than simply stringing together hundreds of microprocessors. The problem is creating access to memory and data in a system in which the memory is distributed alongside many small CPUs rather than pooled centrally.

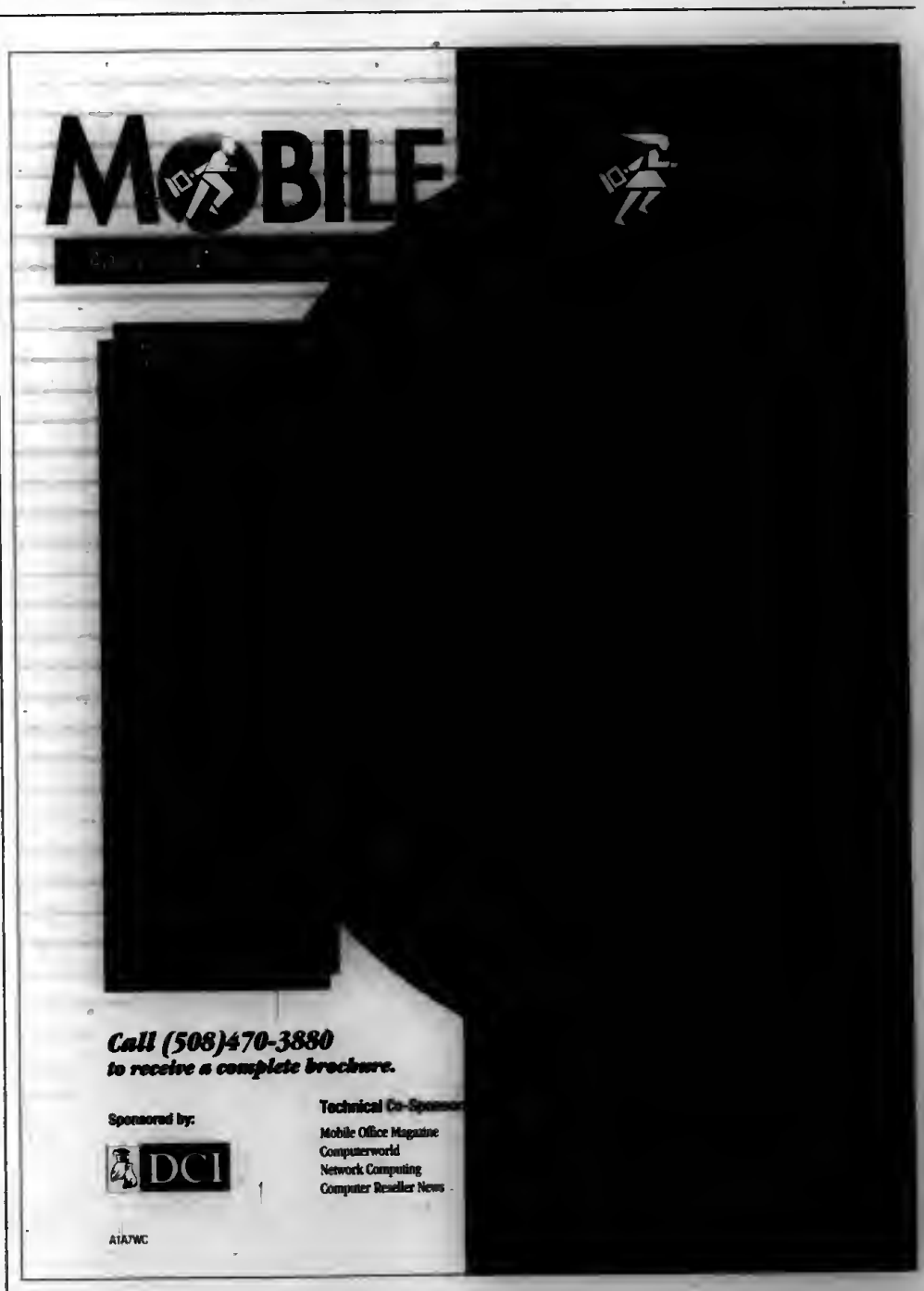
In addition, RISC microprocessors are difficult to design into MPP systems because they have limited memory addressing and are intolerant of latency. If the CPU doesn't find data when needed in the on-chip cache, it idles until the data arrives, which in an MPP system could be from some "far neighbor" point.

DEC's Alpha chip is an exception because it is 64-bit and because Cray had a hand in its design. But Cray must still use its Y-MP-based expertise in high-speed switching to surround the SPARC and Alpha chips with interprocessor communications and synchronization.

Martin Walker, director of parallel applications, claims Cray can avoid some of the blind alleys pursued by MPP pioneers. Cray has a chance to bring its hardware design and packaging and its parallel compiler expertise to bear on the MPP problem.

Performance rates on MPP systems tend to be "only 2% to 5% of the theoretical peak" due to throughput and synchronization constraints between processors, noted George Cybenko and David J. Kuck in the September 1992 issue of *IEEE Spectrum*. Cray thinks it will beat that low throughput and make MPP a more general-purpose technology by the latter part of the decade.

Babcock is *Computerworld*'s technical editor. His MCI Mail address is 575-2737.



THE PERFECT BLEND BEGINS WITH THE

Get a taste of the new world of storage solutions. Only from Conner. We've blended the diverse qualities of Archive, Maynard, Irwin and Ardat into our own. It's the robust new flavor of storage—with disk drives, tape drives, storage management software, bundled storage systems and worldwide distribution.

We've developed this rich mix of storage solutions in response to changing market needs.

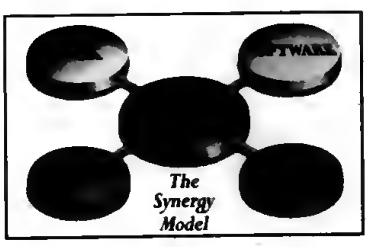
Like increased software and processor performance, and new highly-integrated, enterprise-wide networks. Driving the demand for higher performance, higher capacity disk and tape drives for on-line storage and backup. And creating a growing need for storage management software to tie it all together.

Conner is the first to respond with a truly comprehensive solution. With our complete family of 2.5-inch and 3.5-inch disk drives, in capacities ranging

Conner Peripherals World Headquarters, 3081 Zanker Road, San Jose, CA 95134.

OF STORAGE SOLUTIONS BEST INGREDIENTS.

from 85MB to 1.37GB. For everything from workstations to desktops, to notebooks. To our backup storage solutions featuring a full line of tape drives from minicartridges (DC-2000) and 1/4-inch cartridges (DC-6000) to 4mm DAT and 1/2-inch DLT tape drives. Plus, combined storage systems from entry level data storage to complete network solutions. And the storage management software to make these systems run smoothly.



When you're looking for the world's best blend of storage solutions, call **1-800-5-CONNER**. We're creating a revolution in storage and delivering the right answers for the world's changing computer needs.

CONNER.
The Storage Answer

©1993 Conner Peripherals, Inc All trademarks or registered trademarks are of their respective owners.

"I've Had It.
We're Getting Hayes OPTIMAs. They're Affordable. They're Dependable. I Can't Go Wrong."

As modem prices continue to drop, it's important that reliability doesn't. With the OPTIMA™ family, you can count on the quality of Hayes at very affordable prices. Data modems. Data plus FAX modems. Board versions. Even portables. With speeds from 2400 to 14,400 bps, OPTIMA is Hayes quality at a surprisingly low price.

SPECIAL FEATURES. OPTIMA's Automatic Feature Negotiation selects the best combination of data speed, error-control, and data compression for throughputs of up to 57,600 bps to save big bucks on phone charges. Hayes® AutoSync eliminates the need for buying special adapter cards to communicate with PCs and mainframes. And to help avoid problems like data interruption and compatibility, OPTIMA includes the Hayes patented Improved Escape Sequence with Guard Time and Hayes Standard AT Command Set. Just some of the features that helped Hayes win the Computerworld 1992 I/S Brand Preference Award in 8 categories.

EXTRA BENEFITS FOR YOU. All this low-priced reliability is packed with our famous Smartcom™ software to help you communicate easily in minutes. And it's all backed by a fast, efficient Hayes Technical Support team. Call **1-800-96-HAYES** for your nearest dealer or product literature. In Canada, call **1-800-665-1259**. Hayes quality, low prices, *and* peace-of-mind.

NEW LOWER PRICES

Think OPTIMA...from Hayes.

Hayes®

Why settle for anything less? Hayes products have the computer world talking. More than ever.

Go *Online with Hayes* BBS; call 800-874-2937 or 404-446-6336.

©1993 Hayes Microcomputer Products, Inc., P.O. Box 105203, Atlanta, GA 30348. Hayes, the Hayes logo, OPTIMA, Smartcom, and the Hayes '302 Escape Sequence Patent icon are trademarks of Hayes Microcomputer Products, Inc.

David Coursey

NT isn't worth the wait

Windows NT is a bit like Bill Gates' legendary Porsche (the one that isn't street-legal in the U.S.): If you have to ask, well, you can't afford it. Or, in NT's case, you just don't need the level of joy NT is certain to provide.

NT's marketing history is not one of Microsoft's finest hours. Hardly anyone outside Microsoft really knows who's supposed to buy NT. And customers who think they're in the group would probably be better off waiting while someone else takes the plunge.

Here's a simple quiz for those of you who are considering NT: Are you willing to trust your mission-critical data and applications to a first-generation Microsoft operating system? Do you want to install 12M to 16M bytes of memory on all of your machines to run an operating system that claims 70M bytes of disk space and is often slower than Windows 3.1?

I didn't think so.

And if you have a new hire in your IS shop who urges you down the NT path, you might best consider that person an agent provocateur sent by your competition to bring your infrastructure to its knees.

Coursey, *page 57*

HP slims portable to under 3 pounds

By Mark Halper
SAN FRANCISCO

Although the computer industry likes to talk about "information at your fingertips," most users know that ready-made data actually resides a little further down, maybe closer to the knuckles.

So Hewlett-Packard Co. last week did its part to make information a bit more handy, at least for mobile workers, as it unveiled what analysts called the lightest ever portable Windows computer. It also features advancements in battery and storage technology.

Among other strides, HP built the new OmniBook 300 to run on the same AA batteries that power myriad consumer electronics products.

The 2.9-pound OmniBook is the first portable to incorporate technology that Microsoft Corp. made available last fall through its Portable Computing Initiative. It measures 11.1- by 8.4- by 1.4-in.

A Windows lightweight

Although many DOS portables weigh around 3 pounds, most Windows machines are closer to 5 and 6 pounds so the 20-MHz Advanced Micro Devices, Inc. 386-based OmniBook represents a leap forward, according to Tim Bajarin, president at Creative Strategies Research International, Inc. in Santa Clara, Calif.

Unlike other Windows-based portables, OmniBook uses read-only memory (ROM) to assume some of the storage duties normally assigned to a machine's hard drive. HP is loading the system's 10M bytes of ROM with Windows 3.1 and Microsoft's Word word processing and Excel spreadsheet programs.

Also included are HP's phone book, appointment book and financial calculator software and Traveling Software, Inc.'s LapLink Remote Access program. The ROM is housed on a Personal Computer Memory Card International Association (PCMCIA) card.

Users can call up the ROM-embedded programs by pushing one hot key rather than by booting up, according to HP.

The OmniBook uses ROM *to accomplish storage duties usually done by the hard drive*

HP is offering two storage options, both of which use built-in compression technology to essentially double storage space.

A 40M-byte PCMCIA hard drive offers 80M bytes of storage, and a 10M-byte PCMCIA flash disk offers 20M bytes of storage, HP said.

HP priced the hard drive version at $1,950 and the flash disk version at $2,375. The flash disk version includes two additional PCMCIA slots; the hard drive version houses one extra slot.

Bajarin said those prices are steep for this class of product, but market pressures should bring retail prices down to around $1,700.

Battery life is rated at up to five hours for the hard drive version and up to nine hours with the flash disk, HP said. That compares with about three hours on many notebooks.

While analysts noted that HP drew some of that extended life by compromising on screen quality — its Video Graphics Array-compatible screen is not backlit — they said a nine-hour battery life should attract users.

"When you get on an airplane to cross the country, you want to know if the battery will last or [if] you have to bring heavy batteries for replacement," said Barbara Isgur, president of BSI Consulting in Woodside, Calif.

Although the OmniBook can run on four AA batteries, it comes standard with a rechargeable nickel metal hy-

HP portable, *page 48*

Potholes appear in Pentium path

By Michael Fitzgerald
SANTA CLARA, CALIF

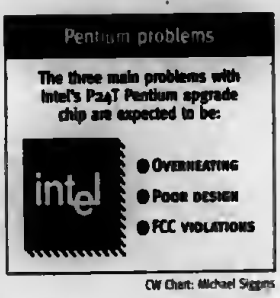
Intel Corp. thought it was doing users a favor when in mid-1992 it began encouraging hardware vendors to design a special version of its OverDrive upgrade socket into their PCs. Foresight may have become oversight, however, because the chip that plugs into the socket — code-named P24T — has a number of problems.

The socket was designed for an OverDrive version of Pentium slated to come out in mid-1994. Intel and systems vendors billed the socket as an easy way for users to upgrade their I486 systems to Pentium performance. For most users, this appears to remain a viable upgrade path. But Intel recently had to acknowledge that some hardware vendors did not properly design their systems [CW, May 17].

The potential problems are threefold:

- The chip may overheat because of poor implementation by systems vendors.
- The chip may not work in the system design.
- Some 486 systems may not meet Federal Communications Commission specifications when Pentium is installed.

Intel has acknowledged the first two issues and said it is working with vendors to minimize problems. The potential for FCC violation "is not one I've heard of anywhere," said Dennis Carter, Intel's vice president of marketing. Sources at major hardware vendors insisted that some designs, mostly those from third-tier clone makers, could very well violate the stringent FCC Class B certification guidelines that apply to computers.



CW Chart: Michael Siggins

Bruce Franca, deputy chief engineer at the FCC's office of engineering and technology, said the agency was "monitoring" the situation, but at this point sees no need to require manufacturers to resubmit 486 systems running P24T parts when the parts become available.

"If it's a problem, we'll be able to tell quickly, but for the most part, a computer that was operating at 50 MHz should be able to move up in frequency without a problem — if it's well-designed," Franca said.

The possible consequences of having a system that violates FCC regulations center largely on interfering with communications, such as telephone calls.

Analysts downplayed the issues around the P24T, citing the lengthy period between now and when it will actually come to market.

"[The press] is beating the horse before it's even born," said Richard Zwetchkenbaum, an analyst at International Data Corp. in Framingham, Mass. "You have to remember that these are problems with something that's still in the lab, so Intel might be able to fix it by the time it comes out."

Users contacted, however, expressed some reservations about the OverDrive upgrade path.

"That chip will be out and stable for at least a year before we think about upgrading with it," said Anthony Hodge, IS specialist in institutional and international portfolio management at Metropolitan Life Insurance Co. in New York.

Pentium path, *page 52*

Now's your

You wanted the power to choose from a world of different applications. DOS applications. Windows™ applications. OS/2® applications. OS/2 2.0 gave you the power. And the response was impressive, to say the least. Over two million copies shipped in less than one year. More than 1,200 OS/2 applications already available*. But now you want more. More features. More functions. More applications to choose from. That's why we're introducing OS/2 2.1.

The new OS/2 2.1 lets you run the latest Windows 3.1 applications, in addition to the DOS, Windows and OS/2 applications you can already run. We've also added TrueType fonts, select Windows applets, File Manager and support for Windows 3.1 printer and display drivers, including 32-bit seamless SVGA support. And now you can start DOS and OS/2 applications from a WIN-OS/2 session, too.

Portable users will be glad to know that OS/2 2.1 provides industry-standard Advanced Power Management (APM) support, to help extend battery life.

▲ *There's no need to buy DOS and Windows to run DOS and Windows applications.*

▼ *With OS/2 2.1 at the heart of your PC, you can run a world of DOS, Windows and OS/2 applications.*

We've made the cursor larger so it's easier to find your place on the screen. And OS/2 2.1 continues to exploit the very latest in technology. You'll find improved support for multimedia applications and pen-based capabilities, along with built-in CD-ROM and AS/400® terminal emulation support.

Of course, OS/2 2.1 still gives you true pre-emptive multitasking, superior OS/2 Crash Protection™ and the easy-to-use object-oriented Workplace Shell™ interface. All the features that made Version 2.0 an award-winner. But now, you also get a whole new world of possibilities.

OS/2 2.1 is now also available on CD-ROM. It comes with exciting

*To order CD-ROM with list of OS/2 applications, call Walnut Creek at 1 800 786-9907. IBM, AS/400 and OS/2 are registered trademarks and OS/2 Crash Protection, Workplace Shell and "Operate at a higher level" are trademarks of International Business Machines Corporation. Windows is a trademark of Microsoft Corporation. TrueType is a trademark of Apple Computer, Inc. ©1993 IBM Corp.

Introducing Version 2.1

chance to run the world.

multimedia samplers, full-motion video demos and more.

Demand OS/2 2.1 preloaded on your next PC.

Call for your free demo diskette.

With our free demo diskette, you can find out even more about all the powerful features OS/2 2.1 has to offer. For your copy, to find out more about OS/2 2.1, or to order, call **1 800 3-IBM-OS2.** In Canada, call **1 800 465-7999.**

Operate at a higher level.™

OS/2 2.1 Advantages

Improves productivity
- Now runs OS/2, DOS, and new Windows 3.1 applications.
- New TrueType fonts, Windows applets, File Manager.
- Advanced Power Management (APM) support extends battery life for portables.
- OS/2 Crash Protection and pre-emptive multitasking.

Easy to use
- Now also available on CD-ROM.
- Object-oriented Workplace Shell interface.

Advanced 32-bit architecture
- Seamless SVGA support.
- Fully exploits latest multimedia applications.
- Supports CD-ROM, PCMCIA and pen technologies.

IBM

System duplicates paper policy applications

By Stephen P. Kiett Jr.
FORT WAYNE, IND

While computers may never completely replace the "paper" office, their screens can be configured to look like paper.

Lincoln National Life Insurance Co. has implemented a client/server system that was designed to replicate traditional paper policy applications on screen via a graphical user interface (GUI).

The goals of the two-year-plus, multimillion-dollar reengineering effort were to improve the turnaround time of processing policy applications, increase the accuracy of tracking applications and cut processing costs.

The Policy Production System (PPS) combines artificial intelligence-based software with a client/server architecture to automate the underwriting function of processing new policies.

Lincoln contracted American Management Systems, Inc., a systems integrator in Arlington, Va., to help design and implement PPS and to provide consulting services. American Management has designed similar systems for other insurance providers, including Mutual Benefit Life Insurance Co. in Newark, N.J.

According to Matt Henderson, vice president of information systems at Lincoln, the new system consists of roughly 10 IBM 1486-based Personal System/2 workstations, 20 PS/2 Model 55SXs and a PS/2 Model 95 server operating under OS/2 1.3. The PCs connect with a 3090 mainframe via a Token Ring local-area network, and Presentation Manager is used as the GUI. The PCs communicate with the mainframe via LU6.2.

ON SITE

Lincoln National Life Insurance Co.
Fort Wayne, Ind.

Challenge: To increase business volume, reduce unit costs and speed turnaround time of processing new policy applications.

Technology: Artificial intelligence-based underwriting software system; client/server network of IBM PCs connected to a 3090 mainframe using Presentation Manager as a GUI.

Results: New policy processing time cut by up to 35%; "Clean" applications can now be turned around in 24 hours where a week was previously required.

The PCs serve two primary functions: build-support, which is data entry and processing, and automated underwriting. The Model 95 acts as an application code repository and provides security functions and some access to the 3090. The mainframe is used as a central data repository, feeding client data to the workstations and maintaining records and tracking works in progress. It also connects with systems outside of Lincoln such as the Medical Information Bureau, which provides Lincoln with a prospective client's medical background.

The GUI was designed to resemble a paper application to make the system more user-friendly for Lincoln's 20-plus new-business departments, Henderson said.

One of the biggest hurdles to overcome, Henderson said, was retraining Lincoln's mainframe CICS and Cobol programmers to work in a client/server environment. "After some initial apprehension, our people went all-out.... They became committed to the technology and the benefits it would provide to Lincoln, and they caught on very quickly," he said.

In the past, when a new application arrived at Lincoln from a field agent, it was sent to a series of mail desks where it was matched with relevant information, such as medical documents, that had been mailed in separately. A data-entry clerk then input the data into a terminal using a complex series of codes.

The application was then bounced back and forth between the underwriters and various departments in paper form before it could be approved. Each department had to log on to the system separately, and information such as the applicant's address had to continually be retyped.

Henderson said this process created a large volume of paper printouts and a lot of rekeying of data for each application, which led to a 30% data error rate. It was also extremely hard to keep track of where an application was.

Working simultaneously

Now, when an application arrives from the field it is immediately keyed in on a PC in the data-entry department and then sent to all relevant departments electronically. This allows several people to review and work on the application simultaneously and has virtually cut paper shuffling out of the process, Henderson said.

According to Henderson, PPS has resulted in considerable cost reductions. For instance, the underwriting staff has been cut by roughly 25% to about 20 people, and processing time has been cut by an average of 25% at the home office; Henderson said this figure will jump to at least 35% once all the field offices are brought on-line. It is now also possible to turn "clean" cases around in 24 hours, where a week was required before.

"The primary external benefit is in the area of customer service. We can now issue policies much faster with nearly 100% accuracy," Henderson said.

Another major plus, he said, is that staff members know where an application is at all times.

Automatic approval

Once an application has completed the processing circuit, it is sent back to the underwriting department for final evaluation. PPS' expert underwriting facility then attempts to underwrite or evaluate the case for approval automatically.

If it is a "clean" case — for example, an application from a 25-year-old male of average height and weight with little or no history of medical problems — more often than not it is approved and sent back to the field agent. If, based on a programmed system of checks and balances, the computer determines an application to be risky, it alerts an underwriter and highlights danger areas for further review.

The majority of processing at Lincoln's home office is now done on the new system, and Lincoln is in the process of bringing its 37 field offices on-line, which is the final step in the transition, Henderson said.

The company plans to have three field offices on-line by the third quarter of this year.

HP portable

CONTINUED FROM PAGE 45

dride battery, the company said.

The OmniBook also includes support for infrared transmission at 115K bit/sec. Standard memory is 2M bytes, expandable to 8M bytes.

Other features include a full-size keyboard, unlike the smaller keyboards found in lightweight DOS portables.

At a joint HP/Microsoft press conference announcing the product last week, Microsoft Chairman Bill Gates said other PC vendors have not yet licensed the technology that enabled HP to make its portable computing advancements.

Analysts said they do not doubt that technology will march on toward smaller and peppier machines. "I think around Fall Comdex, you'll see smaller 486-based portables," Bajarin said. "Which means HP may have a six-month window."

Windows NT source code goes to higher ed

By Christopher Lindquist

Microsoft Corp., taking a cue from the Unix world, has announced plans to present several universities and research institutions with copies of Windows NT source code.

It was the similar licensing of Unix to the University of California at Berkeley by AT&T in the mid-1970s that resulted in the pervasiveness of Unix on college campuses around the country. But while those involved in the source-code distribution plans do not predict a similar scenario for Windows NT, at least for the short term, they all indicated that the move can only help advance Windows NT's cause.

"Microsoft is making a really smart move here," said Tom Doeppner, research associate professor in compnter science at Brown University. Doeppner said the benefits of having Windows NT source code available works both ways: The university gets access to an up-to-date commercial operating system on which to perform research, and Microsoft can take some results from that research and apply it to the commercial release of Windows NT.

However, it is the fact that Windows NT is indeed a commercial product that brings up a question: What will Microsoft do to prevent the splintering of Windows NT into incompatible flavors, as happened with Unix? Several commercial releases of Unix, including Sun Microsystems, Inc.'s SunOS, are based on the Berkeley version of Unix.

David Thacher, Microsoft's group product manager for Windows NT, acknowledged the company's concern about maintaining control over commercial releases of Windows NT but added that Microsoft "won't restrict the flow of code for research purposes."

Thacher said Microsoft will allow researchers to commercialize add-on products to Windows NT like any other developer, but anything requiring changes to core Windows NT code would have to go through Microsoft first. "We will not allow multiple versions" of Windows NT, he said.

Despite this issue, academicians seemed excited at the prospect of getting the source code into their schools. "We'll be able to resynchronize where we are in relation to the commercial world," said Howard Waetlar, vice provost for research computing at Carnegie Mellon University. That, he said, will help the universities in their mission to "create knowledge and transfer it to society."

Such knowledge transfers could also help Microsoft. "We get the benefit of some of the best research minds in the world working on new theories with Windows NT," Thacher said. And that "makes it more likely that we'll be able to implement the technology they deliver in our product line."

Right to the Source

The following universities and organizations will be receiving Windows NT source code for research purposes from Microsoft in the near future

- Brown University
- Carnegie Mellon University
- MIT
- Stanford University
- Xerox Palo Alto Research Center

Introducing two powerful new arguments for OS/2.

The new 32-bit 1-2-3 and Freelance Graphics for OS/2. Every bit as powerful as the system they're designed for.

The new 1-2-3® Release 2 and Freelance Graphics® Release 2 you've been waiting for are here. These are the only major applications made specifically for OS/2® to unleash the full power of 32-bit architecture. And designed to put OS/2 users in business like never before.

With 1-2-3 and Freelance Graphics, you can finally have it all.

All the power of the world's leading spreadsheet. Plus all the simplicity of the top presentation graphics program. Plus all the things you wanted OS/2 for in the first place. Like multitasking, multithreading, drag-and-drop support, and the Workplace Shell™ (which you won't find using DOS or Windows™ applications on OS/2).

BYTE Magazine proclaims: "[Lotus® 1-2-3 and Freelance Graphics] borrow from the best features of their DOS and Windows counterparts, while bringing out the best of Big Blue's 32-bit operating system."* In fact, there's no other software that optimizes OS/2 like these two.

1-2-3 and Freelance Graphics also offer innovative features. Like SmartIcons,™ easy one-click shortcuts to your most frequently used functions. Unique integration so seamless you'll think you're working with one program instead of two. And hotlinks that automatically update data from one program to the other.

Two great applications. No waiting.

Of course, to truly appreciate the power of 1-2-3 and Freelance Graphics for OS/2, you should see them for yourself. Just call **1-800-TRADEUP, ext. 8943,**** for a free 1-2-3 for OS/2 demo disk, or for more information on Freelance Graphics and 1-2-3.

And find out how, together, 1-2-3 and Freelance Graphics create a win-win solution for everyone on OS/2.

Lotus 1-2-3 and Freelance Graphics

Spreadsheet and Presentation Graphics for OS/2

*BYTE Magazine 3/93. **In Canada, call 1-800-GO-LOTUS. ©1993 Lotus Development Corporation, 55 Cambridge Parkway, Cambridge, MA 02142. All rights reserved. Lotus, 1-2-3 and Freelance Graphics are registered trademarks and SmartIcons is a trademark of Lotus Development Corporation. OS/2 is a registered trademark and Workplace Shell is a trademark of International Business Machines Corporation. Windows is a trademark of Microsoft Corporation.

DO NOT EVEN ATTEMPT TO MANAGE YOUR
ENVIRONMENT WITHOUT THE INDUSTRY'S
LEADING SYSTEMS SOFTWARE:

It just isn't worth the risk.

Especially when there's proven, industrial-strength software that can solve all your problems.

Introducing CA-UNICENTER®. The industry's leading systems software from the world's leading systems software company. It gives you absolute control over absolutely everything: security, storage and backups, production, performance monitoring, charge back, you name it.

For Information On Free Seminars And Demo Disks Call 1-800 CALL CAI Ext. 145.

Learn how easy it is to take all the risk out of systems management.

Call today.

After all, isn't your job dangerous enough?

COMPUTER® ASSOCIATES

Software superior by design.

PLAY IT SAFE WITH CA-UNICENTER®

UNIX NETWARE OS/2 MVS VSE NT VMS

© Computer Associates International, Inc., One Computer Associates Plaza, Islandia, NY 11788-7000.
All product names referenced herein are trademarks of their respective companies.

Hallmark offers do-it-yourself cards

Macintosh Centris to anchor touch-screen system

By James Daly
KANSAS CITY, MO.

Not sure what sort of greeting card to send to an elderly aunt or bratty nephew? Not to worry. Design your own.

Starting this month, Hallmark Cards, Inc. will install the first of more than 1,200 in-store computerized kiosks that will enable befuddled card buyers to design and print their own customized work. Along the way, the $2.3 billion sultan of salutations hopes to move toward a just-in-time inventory policy that could trim the tremendous expenses involved in printing more than 11 million cards a day.

The computational guts of Hallmark's Touch-Screen Greetings kiosks will include an Apple Computer, Inc. Macintosh Centris 610 sporting a Motorola, Inc. 68040 chip, 12M bytes of random-access memory, a 230M-byte hard drive and CD-ROM.

Although Hallmark uses mostly a mixed bag of IBM Personal System/2s and PC clones in its corporate offices, Mike Vandemark, technical development manager, said the Macintosh's legendary ease of use made it a cinch for first choice in the touch-screen project. "We're dealing with a very not-computer-literate consumer, so we really needed to make it easy to use," he said.

By the end of the year, project manager Jim Holthus said the card-producing kiosks will be installed nationwide at local grocery stores and pharmacies such as those owned by Walgreen Co. and Osco Drug, Inc.

Hallmark hopes to cut *its printing costs with in-store, card-producing machines. But users will pay a hefty $3.50 per sentiment.*

New way to shop

The kiosks, which are about the size of a video arcade game, may afford another benefit: By adding a refreshing and fun spin to the sometimes tiresome job of picking out the right greeting card, Hallmark could pump more dollars into its coffers. The cards will not be cheap — $3.50 a pop as opposed to less than $2 for most greeting cards — but Hallmark officials are betting the novelty factor will pay off.

Vandemark said card buyers using the touch-screen kiosks will be presented first with the image of a salesperson, who will walk them through the card-design process. A series of screens will appear, asking questions such as "Who is the card for?" "What is the occasion?" and "Is the recipient male or female?"

Navigational buttons will present the user with a series of design suggestions. Approximately 800 card designs will be available, but the possibilities for customization are limitless, as users will be able to write their own message on the front, back or inside. Once designed, a Tektronix, Inc. ink-jet color printer will print out the finished masterpiece.

Best-sellers

Apple custom-designed the software, which will incorporate an automatic product-ranking feature.

That function will allow the best-selling cards at each location to appear on the screen first, thus maximizing sales.

Card selections are updated monthly using compact disks that will be installed by servicepeople.

Each unit will be networked to a central server back at company headquarters to gather sales data and keep tabs on the kiosk's maintenance history, the company said.

Ultimately, Holthus said, he would like to be able to update the entire network's software at the touch of a button.

For instance, Halloween cards would be deleted from the inventory on Nov. 1 and replenished with fresh Christmas card designs.

Other ideas on the drawing board include plans to use remote diagnostic software to repair faulty machines.

To ensure a steady revenue stream, each kiosk also has 24-hour, on-line technical support provided by Apple's service department. Retailers are guaranteed a four-hour response time and restoration of service in no more than eight hours.

Pentium path

CONTINUED FROM PAGE 45

Hodge said his division has been buying PCs with the intent of using the OverDrive upgrade path; he added that he does not expect the P24T part to be a significant problem.

The P24T's potential problems appear to be far-removed from the worlds of users who purchase hardware from major vendors. The design issues that caused the problems seem to have been centered on lesser known clone vendors.

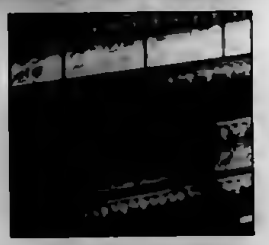
While analysts agreed that poor systems designs are not Intel's fault, they said the company has moved aggressively to correct the situation, including designing a new P24T port.

Intel said it would announce in the fall a verification program to tell users which systems conform to P24T specs.

AT&T SYSTIMAX® SCS products are going fast.

110 Patch System w/ 110 Patch Cord

A reliable, sophisticated patching system which facilitates the interconnection and management of high-speed premises wiring systems up to 155 Mbps. Easy to use and accessible with a rugged design. Features the industry's only IDC based patching system and provides for 1, 2, 3, or 4 pair administration.



100Ω 200Mhz Cables

Uses patented pair-twist scheme to improve transmission performance over twisted pair. Exceeds EIA/TIA requirements and meets ANSI standards. Used as testing standard for Category 5.

M1000 Communications Information Outlet

With high performance, small size and modular design it provides maximum versatility in creating high-speed premises wiring systems. Designed to snap into any M-series modular faceplate, frame, or surface-mount box. Multicolor labels assure fast and accurate installation.

For more details, call:
1 800 344-0223, ext. 3013

AT&T Network Systems

Communicate At Breakthrough Speeds.

Get AT&T's SYSTIMAX® Structured Cabling Systems, And Get Speeds Beyond 100 Mbps.

Over copper. Or fiber. Your network can now have unprecedented speed and interoperability. All by installing AT&T's SYSTIMAX Structured Cabling Systems, with our HIGH-5™ product family of Category 5 components. They support today's network applications and emerging technologies like ATM, up to speeds of 155 Mbps. And this total solution offers you end-to-end connectivity, maximum network compatibility and the ability to evolve your network as your future needs change. All from a single, reliable source. AT&T's HIGH-5 products come with a 15-year extended product warranty, and they exceed EIA-568 Category 5 specifications. The copper cabling was created by AT&T Bell Laboratories and has become the benchmark for Category 5 standardization testing. So find out how AT&T's SYSTIMAX Structured Cabling Systems can help you break through communications barriers. Call us at: **1 800 344-0223, ext. 3013.** Outside the U.S.: **602 233-5855.**

AT&T Network Systems And Bell Laboratories. Technologies For The Real World.

AT&T
Network Systems

©1993 AT&T

If this is how

your computer

does Windows,

have we got a

PC for you.

Don't wait. Put one of our Image™ Series 486 PCs on your desk immediately. You'll get Windows performance that really screams.

And we're not the only ones who feel that way. In a recent review of the Image Series, *PC World* wrote, "Say goodbye to waiting in Windows."

NEC pioneered local bus video technology to speed up graphics-based applications like Windows. Today, as other makers develop first-generation local bus video, we offer advanced, second-generation technology.

Making it fast. Our ingenious Image Video™ technology combines second-generation local bus video with a powerful graphics accelerator, so even the most complex, most demanding graphics applications run full blast. And with our True Color support for over 16.8 million colors and photo-realistic images, those applications will have the impact of a speeding freight train. The bottom line: Your productivity takes a fast turn skyward.

Our new Image PCs are built for easy, 238-pin ZIF-socket upgrades to the next generation of Pentium-based Intel OverDrive™ processors. We've also given them an on-board SCSI II interface, for quick connections to a wide range of peripherals.

But wait: it gets even better. In addition, NEC's OptiBus™ technology can make those peripherals perform up to 30% faster than ordinary systems. While our ImageSync™ feature delivers flawless, flicker-free images with no adjusting when used with one of our award-winning MultiSync® FG™ monitors.

The NEC Image Series. Just part of a whole family of great personal computers, from our affordable PowerMate® PCs, to our expandable Express™ servers. So (why wait?), call 1-800-NEC-INFO or NEC FastFacts™ at 1-800-366-0476, request document 46243.

MultiSync, and PowerMate are registered trademarks and Image Video, ImageSync, Express, FG, OptiBus and FastFacts are trademarks of NEC Technologies Inc. The intel inside logo is a registered trademark of Intel Corp. All other trademarks or registered trademarks are the property of their respective holders. © 1993 NEC Technologies, Inc.

NEC GSAMGS00K1AGS5241

intel inside

PC WORLD BEST BUY

NEC Image 466
May 1993

IMAGE VIDEO

Because ⬆ is the way you want to go.

NEC

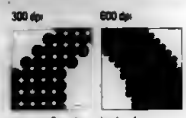
All for one? One for all.

Introducing the HP LaserJet 4M.

Now everyone can tap the power and performance of an HP LaserJet printer. The HP LaserJet 4M. A printer made with everything your PC and Mac users expect: built-in genuine PostScript™ Level 2 from Adobe,™ 6 MB of standard memory, standard LocalTalk, optional EtherTalk, built-in Windows TrueType fonts, and the best 600-dpi print quality available.

Greater flexibility for mixed environments.
Because it's designed to be shared simultaneously, the LaserJet 4M gives you greater flexibility for mixed environments without compromise to either. Automatic language switching between PCL 5 and PostScript, 3 hot I/O ports, and new RISC processor make sure no one will have to wait around for this printer.

The finest print quality in its class.
With HP's microfine toner, Resolution Enhancement technology, and 600 × 600-dpi engine, the new LaserJet 4M printer also delivers the finest 600-dpi print quality available.



Four times the dots for better resolution.

Its wide range of typefaces, two integrated paper trays, and the options of a 500-sheet tray and a power envelope feeder set a new standard in versatility.

HP quality and reliability.
Of course, with the LaserJet 4M printer, you'll enjoy HP's renowned quality and reliability. All for only $2,399.* So call **1-800-LASERJET (1-800-527-3753), Ext. 7341**** for a free print sample.† Or visit your nearest authorized HP dealer.

If it isn't a LaserJet, it's only a laser printer.

HEWLETT PACKARD

© 1993 Hewlett-Packard Company PE12999. *Suggested U.S. list price. **In Canada call 1-800-387-3867, Ext. 7341. Adobe and PostScript are trademarks of Adobe Systems Inc. which may be registered in certain jurisdictions. †To have a LaserJet 4M printer data sheet sent immediately via fax machine, call 1-800-944-1637 from your touch-tone phone.

Execs can sign papers by remote control

Pen computing-based system allows addition of handwritten notes

By Mitch Betts

Pity the corporate chieftain who must postpone a vacation trip to Aruba because the Figgenbottnm contract has to be signed next Tuesday.

Now, a technological solution will let the executive go to Aruba, take along a pen computer and still sign the contract with the company in New York.

This "virtual writing" system for signing documents from remote locations, known as TeleSignature 2000, was develnped by SDB Systems, Inc. in Fort Myers, Fla.

Simply put, the executive signs an image nf the document on the pen computer and then, via modem, sends that signature back to the home office, where a pen plotter signs the paper in ink.

Legal and secure

The actual process is more complicated, however, partly because nf the need to maks the whole affair legal and secure.

The host system is an IBM-compatible PC that runs the special software and hooks up to a boxy contraption called the Scanner/Writer Unit. It scans the document at the outset and bouses the ink plotter that affixes the signature to the paper.

Access is controlled by passwords, and the Scanner/Writer Unit has a security door to prevent someone from switching documents in tbe middle of the process.

The remote system — the one that can be used in a hotel room or vacation cottage — is a pen-based computer tablet loaded with the vendor's software. Both the host and remote units have 14.4K bit/sec. modems for two-way communications that are encrypted for security.

Because the remote user can see the whole scanned page by scrolling around on the pen computer, he can read the "fine print" and add handwritten notations, the vendor said.

TeleSignature 2000 *enables users to send electronic signatures from remote locations*

Any pen computer

The system sells for approximately $5,000, not including the host, remote computers or modems.

Neal Kramer, executive vice president of SDB Systems, said the software will work with any pen-based computer or any laptop computer equipped with a digitizing tablet.

Applications include signing checks, loan settlements, purchase orders and documents during video- or teleconferences. Records of the time and date of each signature — but not the signature itself — are stored to create an audit trail.

Dallas attorney Benjamin Wright, the vendor's legal consultant, said long-distance signatures would be valid in most instances, given that courts have already approved signature marks sent by telegraph and telex.

The legal issues may be trickier in some special cases, such as documents that must be notarized or comply with government regulations, Wright said.

Banks will accept remotely signed checks, he added, if the customer signs the same sort of legal agreement needed for ink-stamped checks.

TeleSignature 2000 got an important tryout during a videoconference on June 3, when an agreement between the chambers of commerce of Mexico and Florida was signed by officials in Mexico City and Tampa, Fla.

Coursey

CONTINUED FROM PAGE 45

Early on, it seemed NT would be the next Windows release for nine out nf 10 of us, a more powerful replacement for Windows 3.X with built-in networking. I'm not sure exactly when Redmond changed the tune, but many people are still expecting to "upgrade" PCs to NT as though it were the next release of DOS. And come to mention it, moving to DOS 6.0 might not be such a good idea, either.

But if you're in tbe group that thinks NT is the Next Thing for everyone in your office, please send a small donation to the charity of your choice in *Computerworld*'s name because I'm about to save you big bucks.

Here's David's quick guide to whether NT is for you: Have you seriously considered OS/2 nr Unix for building client/server applications? Are you running Unix or NT desktops because they nffer more power and greater security than Windows? If the answer to those questions is yes, then yon are a candidate for NT, although either Unix (my choice) or OS/2, or in a stretch, plain-vanilla Windows, might be a better choice, as would be an Apple Macintosh, especially witb PowerPCs in the mix for 1994.

> Are you willing to trust your mission-critical applications to a first-generation operating system from Microsoft?

For mere users the question is simpler: Has someone from corporate IS whom you don't know very well told you you're getting NT — and a new, much more powerful desktop PC to run it? No? Then you are probably safe from hitting the upgrade trail for another year until a developmental project called Chicago becomes the next must-upgrade for rank-and-file Windows nsers.

Before I get labeled as anti-NT (although I do have one of those IBM Nice Try shirts from Spring Comdex) let me wonder aloud why we need yet another operating system.

I am unclear as to exactly what NT does that OS/2 or Unix don't already do as well or better, with the benefit of being, especially in Unix's case, more mature environments.

NT also seems to me more than a little transitional, perhaps a victim of ever-lengthening development cycles and the need to get something nut the door. Customers who buy NT today could start moving away from it in nnly 36 months, perhaps less.

Maybe that's why one Microsoft estimate is that only 10% of Windows' 25 million users might be candidates for NT.

Here's the scenario: Microsoft promises the world in a next version of Windows called NT. Microsoft then discovers the world isn't deliverable on God's seven-day schedule but will require years of development by mortals, even Microsoft mortals.

A decision is made to break the project into two pieces — NT and Chicago. Client/server shops get NT; the rest of the world waits for Chicago, which is due in about a year.

Plan confusion

That plan confuses the market but otherwise works well enough until NT is delayed and starts banging up against the object-oriented operating systems such as Microsoft's Cairo and IBM/Apple's Taligent, which should begin emerging from the shadows in 1995. At that point, what's a customer to do? Buy NT and make the switch to Cairo in 1996, wait or buy something else?

Microsoft has yet to make it clear that buying NT will get customers any real advantage when Cairo happens. Although I am certain they can conjure something up.

But in this light, NT could be but a short-term fix and one customers must weigh carefully before making a big investment.

Coursey is editor of "P.C. Letter," a San Mateo, Calif., industry newsletter. His MCI Mail address is 558-4460.

Now the World's Leading Mainframe C Compiler Features Some Significant Pluses

Introducing the SAS/C C++ Development System from SAS Institute. Another first from the first name in C programming tools for the IBM mainframe environment.

A Plus for Productivity

C++ is an object-oriented superset of the C programming language that makes program development, use, and maintenance easier and more efficient. Now with the SAS/C C++ Development System, you can open the door to object-oriented programming on your IBM mainframes under MVS (batch and TSO) and VM/CMS while preserving your existing investment in C applications.

The SAS/C C++ Development System is fully compatible with the AT&T 3.0 release of the C++ language with the exception of template support. It implements the familiar constructs of the C++ programming language—including in-line functions, operator and function overloading, references, and free store management—providing a robust and productive applications development environment.

The enhanced SAS/C Full Screen Debugger, available with the SAS/C compiler, also supports C++, allowing you to debug C++ as well as mixed C and C++ applications.

A Plus for Portability

The SAS/C C++ Development System is an indispensable tool for migrating existing C++ applications developed in other environments. Applications built on UNIX workstations and PCs can be ported to the mainframe with minimal effort. As a result, your workstation becomes an effective platform for mainframe applications development.

Find Out More In A Free Report

To learn more about the pluses of C++ programming with the SAS/C C++ Development System, simply call or fax us today.

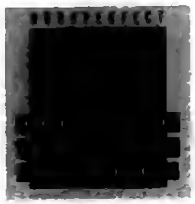
SAS Institute Inc.
Sales & Marketing Division
SAS Campus Drive
Cary, NC 27513
Phone 919-677-8000
Fax 919-677-8123

SAS and SAS/C are registered trademarks of SAS Institute Inc., Cary, NC, USA.
© 1993 by SAS Institute Inc. Printed in the USA.

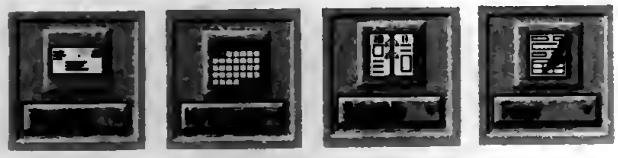
Introducing WordPerfect Office 4.0.

Large or small, local or global, companies operate on meetings. Memos. Deadlines. And paperwork, paperwork, paperwork.

If you've ever had to make ten calls to get four people in the same room, or wait three days for a purchase order from the eighth floor, you know how well the system usually works.



But now there's a new system — a single, cross-platform workgroup application that can handle all your internal business operations and communications electronically. It's WordPerfect® Office™ 4.0, the first "operating system" for companies.



E-mail isn't enough anymore.

Organizations still driven by the telephone and the mail cart may see e-mail as the next step.

But WordPerfect Office advances the technology of e-mail by "mail enabling" not just messages, but all the basic, relentless stuff of business like meetings, appointments, tasks and paperwork. In effect, it automates the flow of work and information through (and throughout) your company.

WordPerfect Office is the first comprehensive calendaring, scheduling and task management program to be integrated with a best-of-breed e-mail engine. There's nothing else like it available today, and perhaps surprisingly, it's available for the cost of e-mail alone.

You make the rules.

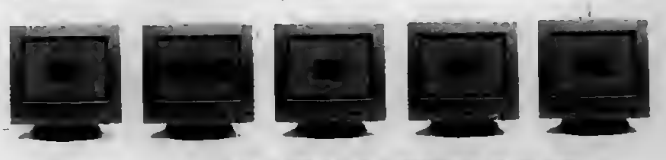
WordPerfect Office lets you control how information reaches you, where it's filed, where it's routed after it leaves your desk. You can accept, reject, or even delegate meeting requests. You or your proxy can check for conflicts on any number of personal calendars across any number of networks — even across dissimiliar computer operating systems — with a single keystroke.

Incoming mail can be automatically sorted and forwarded to others when you're out of town, or you can handle it yourself from your laptop. And with the industry's only electronic Out Box, you can check the status of any message or project at a glance (as well as retract and rethink any unopened messages).

Even forms can be routed electronically.

WordPerfect InForms,™ an electronic forms package included with WordPerfect Office,* can take most of the work — and all of the paper — out of routine office paperwork. Now, you can sign off on timesheets, invoices and other forms electronically and instantly distribute them anywhere in your organization (including virtually any desktop or SQL database).

configuring, monitoring and maintaining your system easier. And perhaps most importantly, support for full directory services to greatly simplify the sharing of names between systems.



A new standard in electronic messaging.

By integrating e-mail, calendaring, scheduling, task management and workflow management into a single, powerful workgroup application, WordPerfect Office can greatly increase productivity with little additional training.

The first new idea in business communications since e-mail.

THE FIRST CORPORATE OPERATING SYSTEM.

Simplified administration across platforms.

WordPerfect Office was developed for LANs of as few as five users and WANs of as many as 100,000. And as you'd expect from WordPerfect, it's a highly-capable cross-platform package, supporting communications on Windows, DOS, Macintosh, UNIX, OS/2 and VAX/VMS.

WordPerfect Office offers a long list of gateways.

Diagnostic and management services to make

See what the first corporate operating system can do. To arrange for a demonstration or free evaluation of WordPerfect Office 4.0, call us at (800) 526-5064.

WORDPERFECT IS A REGISTERED TRADEMARK AND WORDPERFECT OFFICE IS A TRADEMARK OF WORDPERFECT CORPORATION WITHIN THE UNITED STATES AND OTHER COUNTRIES. ALL OTHER BRAND AND PRODUCT NAMES ARE TRADEMARKS OR REGISTERED TRADEMARKS OF THEIR RESPECTIVE COMPANIES. © WORDPERFECT CORPORATION 1993. * FOR A LIMITED TIME ONLY

WordPerfect

THESE FORMS HAVE BEEN DESIGNED, REVIS
THEY HAVE, HOWEVER,

INTRODUCING WORDPERFECT INFORMS.

ED, MAILED, FILLED OUT, SIGNED, AND FILED. NEVER BEEN TOUCHED.

WordPerfect

[redacted]

Database management

Performance Technologies, Inc. has introduced Ace Timer, an end-user performance monitor designed to define performance levels in Oracle Corp.'s Oracle Forms environment.

According to the company, the information that Ace Timer provides can be used in the build cycle to define acceptable levels of service.

The product also has the ability to compare performance between Version 6 and Oracle 7 applications.

Ace Timer is available on Digital Equipment Corp.'s VAX/VMS and most major Unix platforms.

Prices start at $4,000.

▶ *Performance Technologies*
70 Birmingham Pkwy.
Boston, Mass. 02135
(617) 787-1776

IQ Software Corp. has started shipping Intelligent Query (IQ) for Windows.

IQ for Windows offers Microsoft Corp.'s Windows-specific features such as context-sensitive hypertext Help, support for Dynamic Link Libraries and tool bars.

The product supports access to major relational databases including those from Digital Equipment Corp., The ASK Group, Inc.'s Ingres Products Division, Informix Corp., Oracle Corp. and Sybase, Inc., as well as 25 other third-generation language file systems such as Basic and Cobol.

IQ for Windows offers a data dictionary plus an interface designed to produce a variety of different types of output and functions.

IQ for Windows costs $500 per copy.

▶ *IQ Software*
Suite 550
3295 River Exchange Drive
Norcross, Ga. 30092
(404) 446-8880

Natural Language, Inc. has announced that its Natural Language for Microsoft Corp.'s Windows ad hoc query tool will support The ASK Group, Inc.'s new Ingres ODBC Database Driver and Informix Corp.'s relational database management system.

According to the company, Natural Language for Microsoft Windows is a desktop client/server version of Natural language that enables PC users to access relational database information on corporate servers by asking for it in conversational English.

A $595 client version of Natural Language for Microsoft Windows will be available during the second quarter of 1993 for Ingres and Informix RDBMSs.

▶ *Natural Language*
2910 Seventh St.
Berkeley, Calif. 94710
(510) 841-3500

Andyne Computing Ltd. has introduced Pablo, a desktop reporting tool.

According to the company, the product enables users to extract summary information from corporate databases. Pablo uses HyperCube, a technology that allows for multidimensional views of summary information.

To produce reports, Pablo can combine drawing capabilities, data navigation, report layout and flexible tables and charts.

Pablo also features a drill-down facility, automatic updating of information, access to local and remote information sources, charting features, power-sorting capabilities and dynamic linking to host databases.

Pablo will start shipping during the third quarter of this year and will cost $695 per user.

▶ *Andyne Computing*
2nd floor
552 Princess St.
Kingston, Ontario
Canada K7L 1C7
(613) 548-4355

Software application packages

Enable Software, Inc. has started shipping PowerLine, a Microsoft Corp. Windows-based communications package.

According to the company, PowerLine uses the drag-and-drop capabilities of Windows for dialing directories, working with the tool bar and setting up phone books.

The multimedia capabilities of Windows are used, providing audio and visual Help systems for PCs with sound boards. A communications environment called Powerlink is featured with PowerLine that permits the sending and receiving of files and messages between two PowerLine users.

The product costs $149.

▶ *Enable Software*
313 Ushers Road
Northway 10 Executive Park
Ballston Lake, N.Y. 12019
(518) 877-8600

Hayes Microcomputer Products, Inc. has introduced Smartcom for Windows communications software.

According to the company, the product offers the easy-to-use graphical user interface of a Microsoft Corp. Windows application and includes Dynamic Data Exchange support, Windows interface guidelines and Smartcom for Windows language support.

Smart Buttons are provided, making common commands and frequently used scripts available with the click of a button.

The Smartcom for Windows Scripting Language and the Smartcom for Windows Communications Editor are also included.

The product costs $149; however, through July, users can purchase the software for an introductory price of $49.

▶ *Hayes Microcomputer Products*
5835 Peachtree Corners East
Norcross, Ga. 30092
(404) 840-9200

Symantec Corp. has announced Version 3.0 of Q & A Write for Windows, a word processor designed for Microsoft Corp. Windows.

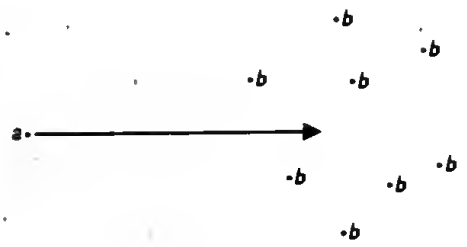
Features for the product include extensive mail merge capabilities with Q & A, dBase and Paradox files and transparent file conversions from WordPerfect Corp.'s WordPerfect and Microsoft's Word.

Q & A Write for Windows is communications-enabled, providing direct fax and electronic-mail support, the company said.

The product provides capabilities for file sharing over networks and supports Object Linking and Embedding and Dynamic Data Exchange with other applications. Requirements include an IBM PC AT or 100% compatible running with Windows 3.1 or higher.

Q & A Write for Windows Version 3.0 costs $69.95.

▶ *Symantec*
10201 Torre Ave.
Cupertino, Calif. 95014
(408) 253-9600



Where is your information technology taking you? Recent advances in information technology have dramatically changed the way companies use and structure their services and operations to achieve new goals.

Managing the Information Services Resource examines the strategic uses of information technology and plugs senior executives into new concepts and updated skills. Essential in achieving improved control and planning, it offers a new level of awareness that translates into competitive advantage.

For more information on maximizing your information services call us at **617-495-6226, ext. 10**, or fax us at **617-495-6999.**

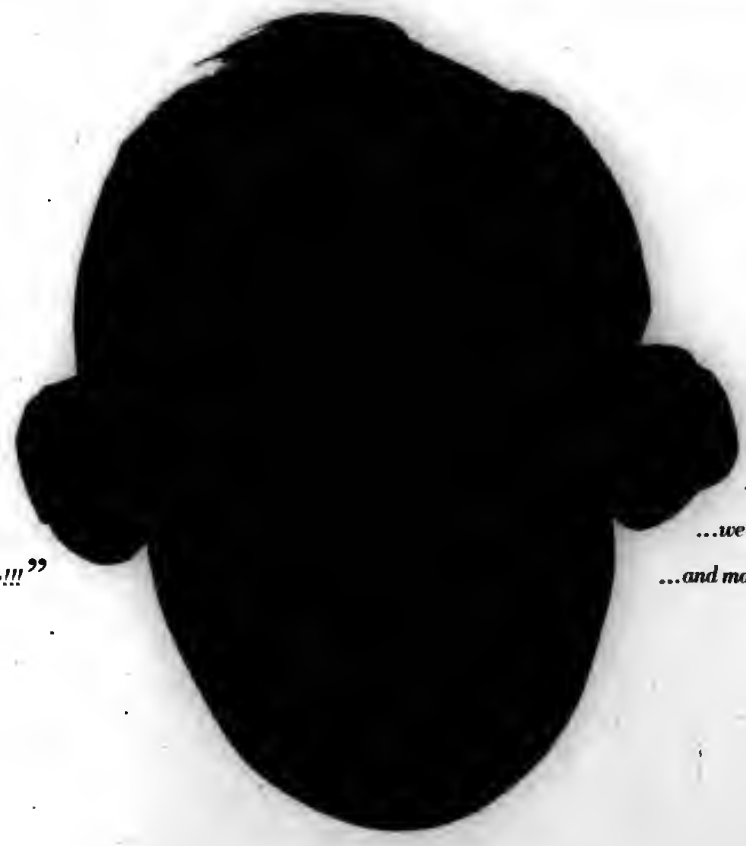
MANAGING THE INFORMATION SERVICES RESOURCE

JULY 25–AUGUST 6, 1993

Harvard Business School
Executive Education

Harvard Business School is an affirmative action/equal employment institution. Dates and tuition subject to change.

Diagnosis: *Acute Demanditis*



"Flanders!...do more with our equipment... watch your costs... don't sacrifice quality... and make us competitive!!!"

"Listen, Ed...what about object-oriented ...and client/server??? ...we need applications now ...and make 'em easy to use!!!"

Cure: SAPIENS

Addressing the demands of corporate managers, application users and everyone in between can be overwhelming. Unless you have SAPIENS.™

SAPIENS' innovative rapid application development software builds sophisticated applications faster. And it slashes the time you spend updating those applications.

SAPIENS also protects your mainframe investment with object-oriented technology that's database-independent *and* portable across MVS, VM and VSE environments. SAPIENS even offers a client/server solution that transforms your mainframe into a powerful enterprise server.

All of which means increased productivity for application developers. Satisfaction for end-users. A critical edge for corporate managers. And peace of mind for you.

Get the cure with SAPIENS products and services. In the U.S. and Canada, call today: 1 800 392-7028 (ask for 1003).

SAPIENS

R A P I D A P P L I C A T I O N D E V E L O P M E N T

IBM has exclusive marketing rights to SAPIENS in the United States. IBM is a registered trademark of International Business Machines Corporation. SAPIENS is a trademark of Sapiens International Corporation N.V.

Are you about to get burnt buying the wrong tool?

Choose the wrong business computer and you may end up taking some heat.

That's why I/S professionals like you are moving to the right tool for the job: workstations.

And when you look at workstations, you'll see that only one comes from a company 100% committed to the needs of business.

Axil Workstations.

We're like no other workstation company around. The difference is our focus. We're delivering SPARC® systems built specifically to drive the productivity of business. Which we're now doing for hundreds of customers worldwide.

All through quality, American-made workstations with business features. Not to mention our modular, upgradeable design that protects your investment.

And it's all backed by the service and support of both Axil and our dedicated VAR partners.

Plus you can run all your existing software. Axil guarantees it. For proof, there's our 90-day SPARC Compliant money-back guarantee. And our Executive Membership in SPARC International.

So call 800-284-AXIL. Discover the new workstation company that's backed by Hyundai® and dedicated to getting your business done to perfection.

The business engine

Axil
WORKSTATIONS

Axil Workstations is a division of Hyundai Electronics America. Hyundai is a registered trademark of Hyundai Electronics Industries, Inc. Other trademarked names are owned by their respective companies or organizations.

Vendor releases NLM version of object database

By Kim S. Nash
BURLINGTON, MASS

Object Design, Inc. recently unveiled a NetWare Loadable Module (NLM) version of its object-oriented database, claiming it is the first object-oriented database management system available for Novell, Inc.'s popular network operating system.

ObjectStore NLM Server was designed to store images, sound and other dense data generated by telephony and multimedia applications. Adding NLM compatibility means that information stored and manipulated as objects can be made available to users distributed across a Novell network.

Object technology provides users with faster access to complex data than a relational database, said Ian Schmidt, director of desktop and network products at Object Design.

Traditional relational database management system makers such as Oracle Corp. have announced NLM versions.

ObjectStore does not have to translate the very dense, complex data of which images and sounds are constructed into a traditional table or record, as a relational database must, be explained.

ObjectStore on NetWare gives Object Design access to a platform that can accommodate several hundred users, Schmidt said.

Early users include Granite Construction in San Jose, Calif., and third-party software maker Cadkey, Inc. in Windsor, Conn.

Running on Unix workstations and servers from Digital Equipment Corp., Hewlett-Packard Co., IBM and others, ObjectStore competes with object-oriented DBMSs and development tools from Servio Corp. in San Jose, for example. Both products are compatible with Transmission Control Protocol/Internet Protocol networks, but Servio has no plans for an NLM version of its GemStone database, a spokesman said.

ObjectStore NLM Server, due to ship by August for NetWare v3.11 and 4.0, will be priced at $2,250 for an end-user runtime license and $7,500 for a developer's license, a spokeswoman said.

Aside from the NLM deal, Object Design and Novell are further entangled. In January 1992, Object Design sold ObjectStore licenses to HyperDesk Corp. to build into Distributed Object Management System (DOMS). HyperDesk's DOMS is an administration and data management tool geared specifically to handle objects.

Then, in February of this year, Novell announced plans to integrate DOMS — which already contains ObjectStore — into NetWare to provide enterprisewide object management.

Will users ever move to Sun's Solaris?

Adoption of strategy may take more time, analysts say

By Jean S. Bozman
MOUNTAIN VIEW, CALIF.

It will take longer for Sun Microsystems, Inc.'s Solaris strategy to play out in user sites than to ship out on the new machines rolling off Sun's assembly lines.

Industry analysts projected that 800,000 copies of Solaris will be running on Sun platforms by the end of 1994, an amount equal to the current number of Sun operating system licenses worldwide. Much of that growth will be driven by Sun's shipment of Solaris 2.X on more than 250,000 Sun systems each year. The rest will come from Solaris 2.X running on Intel Corp. 1486 machines and through migration from SunOS 4.X, also known as Solaris 1.0.

However, users at some large Sun sites said modification of a large inventory of custom SunOS applications, often involving hundreds of systems, could slow their own porting process. That is because the differences between the commands used in SunOS 4.1.3 and in Solaris 2.X — which is compatible with Unix System V Release 4 — are considerable.

"Your files will need modification: The paths will be different, and the commands are based on [Unix] System V, so the shell scripts will need modification," explained John Grieggs, an application design consultant at the Jet Propulsion Laboratories in Pasadena, Calif. The laboratory has more than 1,000 Sun machines, only a small fraction of which run Solaris 2.X, he said.

Even so, Sun executives said their 1992 release of Solaris 2.1 was made to support advanced features such as symmetrical multiprocessing and multithreading, along with the Unix System V standard.

"The message has been communicated very clearly, but sometimes there is a latency in the marketplace in moving to a new technology," said Michael Zadig, director of sales and development engineering at Sun subsidiary SunSoft, Inc., which designs and sells Solaris. The pace should quicken as third-party software firms port their products to Solaris 2.0 this year, he said. Solaris 2.3 is due by year's end.

Own worst enemy

Sun's biggest problem in pushing Solaris into existing large user sites may well be its own success, analysts said. "Sun has the enviable problem of having a satisfied customer base," said David Card, director of systems research

Sun's Solaris, *page 67*

Move long?
Industry analysts acknowledge that effort behind reconfiguration has paid off. It may not be as time-consuming as some users think. Some large user sites have reported that it takes several months to port and debug applications. Others anticipate an effort of several months. Even if users cannot bear to relegate all their old applications, Michael Zadig, director of sales and development engineering at SunSoft, suggested using aging SunOS machines as network nodes that can be accessed from Solaris 2.X machines.

Networking exotic peripherals still difficult

By Michele Dostert

It's a brave new world in the PC peripherals market. CD-ROM players, image scanners, optical juke-boxes, plotters, fax servers and color printers are streaming into the marketplace.

Though these peripherals have become commonplace, connecting them to local-area networks is still a struggle, information systems managers said. They cited a lack of device drivers, unintentional conflicts with other network devices and programs and support runarounds as their biggest headaches when dealing with exotic peripherals.

David Eckert, an advanced technology and architecture analyst at Westinghouse Corp. in Aiken, S.C., has successfully added CD-ROM players and high-speed network printers to his LANs but said he is wary of other peripherals.

"We are starting to see user demand for things like scanners and plotters, but frankly, I've been disappointed in the support I've received from these device makers — most of them don't really understand networking — so we've been reluctant to add them," he said.

For example, Eckert said he would like to add color printers, scanners and plotters to his networks but needs them to be attached to and managed from centrally located servers. He said he also needs a mechanism whereby peripheral use could be tracked by and billed to the appropriate department.

LAN operating system vendors have different strategies for support of peripheral devices. Novell, Inc. relies on device makers to create the software drivers that enable their products to run on Novell's NetWare LANs. After a vendor submits its product and driver to Novell laboratories, Novell engineers test them. If they pass, the product and driver receive Novell certification.

"In the last year, we've tested hundreds of peripheral devices," said Mike Dahlgren, manager of Novell's testing center. "Before we certify it and commit ourselves to supporting it, we pound on it pretty thoroughly."

Users cautioned, however, that Novell certification is not a guarantee that a peripheral will snap into a network without problems.

"Novell can't test for every possible configuration; it would take them years," said Dan Kohner, manager of network services at M. D. Anderson Cancer Center in Houston. Kohner has sophisticated medical imaging equipment, fax servers, CD-ROM players, optical jukeboxes and col-

Exotic peripherals, *page 70*

According to IDC Strategic Decisions, a Norwell, Mass., research firm, only 17% of scanners in corporate environments were networked in 1992. However, 29% of unnetworked respondents said they plan to network their scanners this year.

Pete Roberts

System fallacies

Of all the topics discussed in the IS press, none have been presented with more misconceptions and hogwash than the subject of "client/server."

As a result, many people use inappropriate criteria to determine if they should convert to a client/server system. They make decisions based on the organization of the hardware in a system instead of the organization of the system's software. Consequently, they buy new systems, toss out existing systems and disrupt their entire shop, guided by smoke and mirrors.

What's in a name, you say? Sometimes nothing. But in this case the wrong use of the term client/server leads to some strange ideas. In particular, people discuss "getting rid of their mainframes and going to a client/server system" and that "there is room for both mainframe systems and client/server systems." Or worse, writers complain that client/server systems are not appropriate solutions and that we still need powerful processing machines and terabyte central storage repositories. Of course we do, but what has that got to do with whether a system has a client/server design? The industry seems exercised over a nonissue, prompting inappropriate decisions.

A client/server design refers to organizing the software into independent modules that interact with one another using a command/response mechanism. It does not refer to the types of physical components in the system or whether they sit on a desktop or on the floor.

In fact, a true client/server system can be implemented entirely within one mainframe. Conversely, a tightly coupled homogeneous system can be designed for a topologically distributed system consisting of server-type computers and desktop computers.

It is true that certain computers are called servers because they hold large amounts of common data, execute centralized E-mail applications and so on. This name choice is unfortunate because the presence of a server in a distributed system does not ensure that the system has a client/server design.

Client/server design was developed for the same reason that structured programming and object-oriented techniques were introduced: encapsulation of functionality. This organization results in more robust systems that cost less to implement and maintain.

Some of the software modules in a client/server system are clients. Some are server modules. Some modules are both clients and servers. Each encapsulated module performs a well-defined task. Each may call on the services of other modules to perform subtasks, and each may, in turn, be called by other modules to perform a subtask. The modules may all execute in one computer, or the system may consist of many hardware platforms distributed over thousands of miles, linked by LANs and WANs.

The functionality of a client/server system is determined by the functionality of each of the software modules and the interactions of these modules, independent of where they execute. It is the performance requirements of a system that regulate, to a large extent, the locations of the physical components upon which the software modules execute.

Where are the users located and where does the data repose? What is the average and maximum response time required for transactions? What bandwidth is available on the various communication channels? What is the total amount of processing power required for the entire system? What are the costs? These and other issues determine the physical structure of a system — not whether a system is client/server.

Ignore the client/server assertions. They fail to address the real issues and will help you not one whit.

Roberts is a principle of Roberts Consulting in Corte Madera, Calif.

ANNOUNC
SUMMER SALE.
IBM AND
ARE STARTIN

DELL® 425s/L
i486™ SX 25MHz SYSTEM
$1,599 SAVE $119
- Business Lease†: $59/MO.
- 4MB RAM • 170MB (17ms) Hard Drive
- 3 ISA Expansion Slots
- Upgradeable to Pentium™ Technology
- Accelerated Local Bus Video
- UltraScan® 14C Monitor (14", 1024 x 768, .28mm, NI)
- Dual Diskette Drives (3.5" and 5.25")
- MS-DOS® 6.0/Microsoft® Windows 3.1/ Mouse

DELL 433s/L
i486 SX 33MHz SYSTEM
$1,849 GREAT VALUE
- Business Lease: $68/MO.
- 4MB RAM • 170MB (17ms) Hard Drive
- 3 ISA Expansion Slots
- Upgradeable to Pentium Technology
- Accelerated Local Bus Video
- UltraScan 14C Monitor (14", 1024 x 768, .28mm, NI)
- One Diskette Drive (3.5" or 5.25")
- MS-DOS 6.0/Microsoft Windows 3.1/ Mouse

DELL 433/L
i486 DX 33MHz SYSTEM
$1,999 SAVE $219
- Business Lease: $74/MO.
- 4MB RAM • 230MB (17ms) Hard Drive
- 3 ISA Expansion Slots
- Upgradeable to Pentium Technology
- Accelerated Local Bus Video
- UltraScan 14C Monitor (14", 1024 x 768, .28mm, NI)
- Dual Diskette Drives (3.5" and 5.25")
- MS-DOS 6.0/Microsoft Windows 3.1/ Mouse

DELL MULTIMEDIA 450/L
i486 DX2 50MHz SYSTEM
$2,599 SAVE $178
- Business Lease: $96/MO.
- 4MB RAM • 230MB (17ms) Hard Drive
- 128KB SRAM Cache
- Upgradeable to Pentium Technology
- Accelerated Local Bus Video
- UltraScan 14C Monitor (14", 1024 x 768, .28mm, NI)
- One Diskette Drive (3.5" or 5.25")
- MS-DOS 6.0/Microsoft Windows 3.1/ Mouse
- ▸ Internal CD ROM
- ▸ 16-Bit CD-Quality Audio
- ▸ Amplified Speakers

DELL 450/M
i486 DX2 50MHz SYSTEM
$2,799 SAVE $250
- Business Lease: $104/MO.
- 8MB RAM • 320MB (17ms) Hard Drive
- 128KB SRAM Cache
- 6 ISA Expansion Slots
- Upgradeable to Pentium Technology
- Accelerated Local Bus Video
- UltraScan 15FS Monitor (15", 1024 x 768, .28mm, NI)
- One Diskette Drive (3.5" or 5.25")
- MS-DOS 6.0/Microsoft Windows 3.1/ Mouse

DELL MULTIMEDIA 466/M
i486 DX2 66MHz SYSTEM
$2,999 SAVE $509
- Business Lease: $111/MO.
- 8MB RAM • 320MB (17ms) Hard Drive
- 128KB SRAM Cache
- Upgradeable to Pentium Technology
- Accelerated Local Bus Video
- UltraScan 15FS Monitor (15", 1024 x 768, .28mm, NI)
- One Diskette Drive (3.5" or 5.25")
- MS-DOS 6.0/Microsoft Windows 3.1/ Mouse
- ▸ Internal CD ROM
- ▸ 16-Bit CD-Quality Audio
- ▸ Amplified Speakers

*Guarantees available on USA only for registered owners of Dell Performance Series systems purchased after 7/1/92. For a complete copy, please call our TechFax® line at 1-800-950-1329 or write Dell. †Prices valid in U.S. only. Some products and promotions not available in Canada or Mexico. ‡Leasing arranged by Leasing Group, Inc. ◊On-site service provided by BancTec Service Corporation. On-site service may not be to a registered trademark and i486 and Pentium are trademarks of Intel Corporation. Dell disclaims proprietary interest in the marks and names of others. ©1993 Dell Computer Corporation. All rights reserved.

Sun's Solaris

CONTINUED FROM PAGE 65

at International Data Corp. here. "It's a very stable, solid operating system that people like."

Card said he expects users to cross over from SunOS to Solaris 2.X sometime in early 1994. "That's slower than Sun would have it," he noted.

Some users said older applications at their sites may stay on SunOS for now because it is either too difficult or too costly to rewrite code with SunOS' Unix extensions from the University of California at Berkeley. Or they may stay indefinitely, provided the application is stable and does not need a hardware upgrade. But applications written for Sun's SPARCserver 1000 and SPARCcenter 2000, for example, will require Solaris 2.X, as will Sun-compatible software written for Intel 486 machines. To aid porting, Sun has shipped various migration tools to users.

Porting applications, though painful, is necessary to keep current with Sun technology, users said. "It's going to happen, and it's actually going to be better when it's done, but it's a difficult transition," said Randy Huntzinger, a computer specialist at the National Institutes of Health in Bethesda, Md. Programmers and system administrators will be harder hit than end users, as they must recompile existing applications to heed Solaris commands, he said.

Analysts said many users will move to Solaris 2.X simply to stay on Sun's technology curve. "The benefit of migrating to Solaris is avoiding the possibility of being painted into a corner," said Neal Hill, a senior analyst at Forrester Research, Inc. in Cambridge, Mass. "Otherwise, users have at best a patch strategy of maintaining SunOS and Solaris applications at the same time."

Still, many SunOS users await the wide availability of third-party software for Solaris. "Until everybody gets aboard with 2.X and customers say they're comfortable, many people will stay where they are," said Bill Niemi, director of distributed systems at Fidelity Investments in Boston, a large Sun site. "A lot of the software vendors are just about there, but it's still early in the game."

NG DELL'S NO WONDER COMPAQ G TO SWEAT.

DELL 450/ME
i486 DX2 50MHz SYSTEM
$3,299 SAVE $549

- Business Lease: $122/MO.
- 8MB RAM • 450MB (12ms) Hard Drive
- 128KB SRAM Cache
- 4 EISA Expansion Slots
- 2 ISA Expansion Slots
- Upgradeable to Pentium Technology
- Accelerated Local Bus Video
- UltraScan 15FS Monitor (15", 1024 x 768, .28mm, NI)
- One Diskette Drive (3.5" or 5.25")
- MS-DOS 6.0/Microsoft Windows 3.1/ Mouse

DELL 466/ME
i486 DX2 66MHz SYSTEM
$3,999 SAVE $250

- Business Lease: $144/MO.
- 8MB RAM • 450MB (12ms) Hard Drive
- 128KB SRAM Cache
- 4 EISA Expansion Slots
- 2 ISA Expansion Slots
- Upgradeable to Pentium Technology
- Accelerated Local Bus Video
- UltraScan 17FS Monitor (17", 1280 x 1024, .28mm, NI)
- One Diskette Drive (3.5" or 5.25")
- MS-DOS 6.0/Microsoft Windows 3.1/ Mouse

DELL 466/T
i486 DX2 66MHz SYSTEM
$2,999 SAVE $519

- Business Lease: $111/MO.
- 8MB RAM • 450MB (12ms) Hard Drive
- 128KB SRAM Cache
- 8 ISA Expansion Slots
- Upgradeable to Pentium Technology
- Accelerated Local Bus Video
- UltraScan 15FS Monitor (15", 1024 x 768, .28mm, NI)
- Dual Diskette Drives (3.5" and 5.25")
- MS-DOS 6.0/Microsoft Windows 3.1/ Mouse

DELL 466/T
i486 DX2 66MHz SYSTEM
$3,499 SAVE $519

- Business Lease: $129/MO.
- 8MB RAM • 450MB (12ms) Hard Drive
- 128KB SRAM Cache
- 8 ISA Expansion Slots
- Upgradeable to Pentium Technology
- Accelerated Local Bus Video
- UltraScan 17FS Monitor (17", 1280 x 1024, .28mm, NI)
- Dual Diskette Drives (3.5" and 5.25")
- MS-DOS 6.0/Microsoft Windows 3.1/ Mouse

Ah, summertime. The season of sun, baseball and Dell's competition sweating like maniacs. Not because of the weather, though. But because they know our sale saves you as much as $549 off our already incredibly priced systems. And the systems to your left are only 1/1000 of what Dell literally has to offer.

intel inside

But we don't stop at great systems and great choices at great savings. We also give you some of the greatest service and support in the industry. If you ever need support, you can call us 24 hours a day, seven days a week. If needed, we'll send someone the next business day,* guaranteed. And with Dell ReadyWare,** you can easily get up to 80 different applications pre-loaded for one small $15 fee. Saving you time, energy and aggravation. Not to mention money.

So order your Dell systems because this offer ends July 31st. And we'll give you what you need. No sweat.

DELL

TO ORDER, CALL
800-247-4617

HOURS: MON-FRI 7AM-9PM CT SAT 10AM-4PM CT SUN 12PM-5PM CT
IN CANADA, CALL 800-668-3021. IN MEXICO CITY, 228-7811 #11484

USA L.P., 9505 Arboretum Blvd., Austin TX 78759-7299. Attention Guarantees. *No other discounts apply. **available in certain urban areas. MS-DOS and Microsoft are registered trademarks of Microsoft Corporation. The Intel Inside logo

Forms software vendors join forces

By Michael Vizard
TORONTO

As part of a bid to extend the reach of its electronic forms software beyond Windows and DOS platforms, Delrina Corp. has signed a development pact with Shana Corp., a maker of electronic forms software for Apple Computer, Inc.'s Macintosh based in Edmonton, Alberta.

Under the terms of the agreement, the two companies will work together to allow users to create forms using products from either company and then have those forms filled out by users of either the Delrina or Shana software.

"We're delighted," said Lynda Spencer, section supervisor for user services at Johns Hopkins Hospital in Baltimore. Spencer, who uses the Delrina software, said that with the integration, she will no longer have to moderate discussions between users of Microsoft Corp.'s Windows and the Macintosh over which platform has the better forms software.

The integration of the Delrina software, which consists of PerForm Pro Plus and FormFlow, and the Shana software, which consists of Informed Foundation, is scheduled to be completed next month.

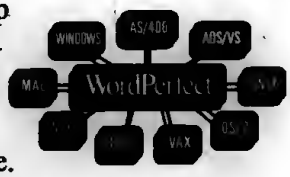
In contrast, WordPerfect Corp. in Orem, Utah, will deliver its Informs for Windows package at the end of this month, followed by DOS and Macintosh implementations later this year.

COMPUTERWORLD
CAREERS ON-LINE
508 879-4700
with your computer/modem

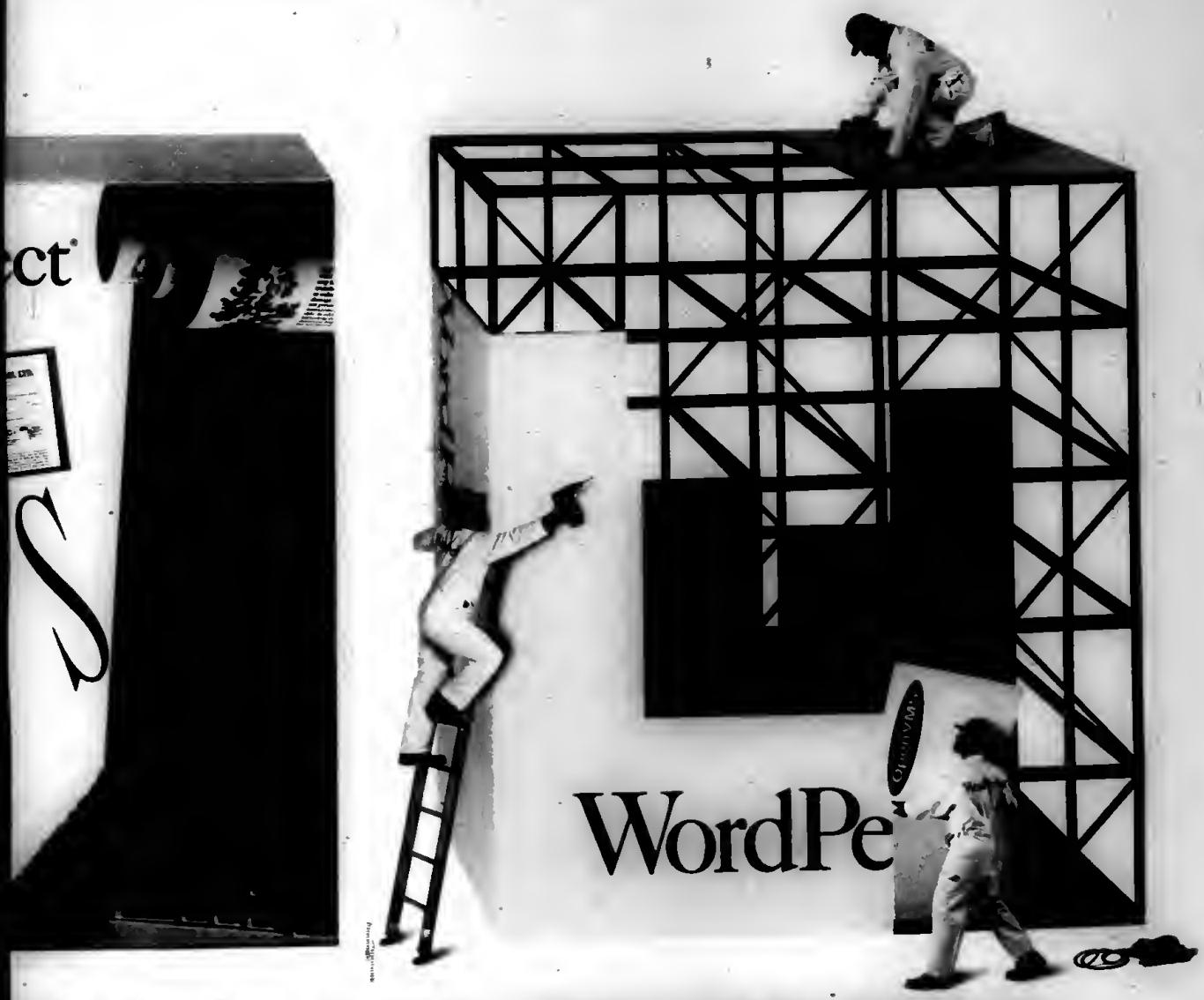
VMS WORD PROCESSING FOR YES

Whatever the future brings for VAX/VMS users, you can rest assured that WordPerfect® will be there. We're committed to Digital platforms, including today's VMS and tomorrow's OpenVMS.

For today's VAX user, WordPerfect for VMS offers the same power and flexibility found in our best-selling desktop versions. And we're building a new WordPerfect for OpenVMS so you'll have a choice in the future. Either way, WordPerfect can help you effectively use your DEC system, preserving the value of your DEC hardware investment.



WordPerfect is a registered trademark of WordPerfect Corporation in the United States and other countries. All other brand and product names are trademarks or registered trademarks of their respective companies. © WordPerfect Corporation 1993.



TERDAY, TODAY, AND TOMORROW.

Unlike other word processors for VMS; versions of WordPerfect are available for a wide variety of different computing platforms, including UNIX, AS/400, DOS, Windows, and Macintosh. With WordPerfect, you can exchange word processing files across systems and platforms without losing important formatting information.

1 9 9 3
digital news & review
TARGET AWARDS
WINNER

Target Awards Winner for the seventh year in a row.

If you need a word processor for VAX/VMS that will continue to work for you in the future, contact your WordPerfect reseller, systems integrator, or VAR. Or call WordPerfect Corporation at (800) 526-2649 for more information. We'll show you the future of VMS word processing–for tomorrow and beyond.

WordPerfect®

Closing in on fast Ethernet standard

By Lynda Radosevich
WAKEFIELD, MASS.

Progress made last month toward development of a standard for 100M bit/sec. Ethernet included a new proposal for signaling techniques that allow Fast Ethernet to run over two pairs of Category 3 unshielded twisted-pair cabling. The move was intended to allow users to run the fast technology with existing two-pair cabling schemes.

Also, members of the IEEE 802.3 subcommittee for the fast Ethernet standard agreed that this month they will draft the project authorization request that precedes a formal draft standard.

The cabling issue is important because Category 3 cabling is still the most pervasive scheme, said Patricia Thaler, a principal engineer at Hewlett-Packard Co. and subcommittee chairwoman.

Original proposals for fast Ethernet discussed supporting two pairs of Category 5 unshielded twisted-pair cabling or four pairs of the lower grade Category 3 cabling, requirements that might be too steep for some users, Thaler said. Also, the committee is considering extending the standard to support fiber and other cabling schemes as well.

At the next meeting on July 12 in Denver, the subcommittee will tackle this and the even thornier issue of which media access control (MAC) method to pursue for the standard. The two methods most likely to be considered are Ethernet's CSMA/CD method or a new method proposed by HP and AT&T called demand priority, Thaler said.

Several subcommittee members said they expect two standards to emerge in July based on the separate MAC proposals. If so, the market could likely be confused by the similar options, they said.

Separately, 3Com Corp. showed its 100M bit/sec. Ethernet technology using two PCs with different Ethernet cards and a Novell, Inc. NetWare 4.0 server. The PC with a 100M bit/sec. Ethernet card ran a sample application roughly nine times faster than the PC with a 10M bit/sec. card.

Exotic peripherals

CONTINUED FROM PAGE 65

or printers connected to his network. "We've added some products that said they were NetWare-compatible and ended up writing our own drivers for them."

Banyan Systems, Inc. in Westboro, Mass., maker of the Vines LAN operating system, has traditionally insisted on building all software device drivers. But users have consistently complained about Banyan's slow release of drivers. In response, Banyan has opened a testing and certification service where third-party drivers can be Banyan-certified.

Microsoft Corp. also builds some of its drivers, such as the CD-ROM support in LAN Manager, and certifies devices from other vendors to work on LAN Manager networks. But Microsoft's testing suffers from the same limitations as Novell's.

"Microsoft may not have tested the product on your server or with your network cards or your applications, and there could be problems," said Claude King, network manager at the University of Florida's school of journalism in Gainesville, Fla.

Be careful what you add

Users warned that adding peripherals can have unintended — and disastrous — consequences.

"We've tested devices that suddenly caused problems in totally unrelated areas or suddenly swamped our network backbone," Kohner said. "If you have a complex, multivendor environment like ours, you must test everything yourselves before you add it to your network.

"Often, the best way to add peripherals is to hire the system integration services of whoever made your server and pay them whatever they ask to install and support the device. Otherwise, you'll end up spending weeks calling device vendors and coding custom software patches," he said.

ONLY
CINCOM SUPRA SERVER
HAS THE POWER
TO GET THE
ENTERPRISE JOB DONE

[redacted]

LAN hardware

Computone Corp. has introduced IntelliServer, a terminal server for local-area networks that connects directly to a Transmission Control Protocol/Internet Protocol Ethernet LAN using AUI or BNC connectors.

IntelliServer can connect modems, printers, high-speed serial X Window System terminals and PCs running X terminals to a LAN, according to the company. A menu-driven interface is provided for new users, and IntelliServer supports rlogin, remote-control printing protocols and industry-standard Telenet. The 16-port intelliServer is expandable to 64 ports in 16-port increments.

The 16-port IntelliServer costs $2,995. Snap-on 16-port expansion modules are priced at $1,095.

▶ *Computone*
1100 Northmeadow Pkwy.
Roswell, Ga. 30076
(404) 476-2725

Alps Electric, Inc. has introduced RadioPort/Parallel Wireless LAN Adapter for peer-to-peer and client/server networks.

The adapter eliminates the need for cabling and can be used for file transfer, electronic mail and printer sharing. Without disrupting the rest of the network, users can set up, add, remove or relocate workstations, the company reported. The product includes an AC power adapter, user-friendly, menu-driven software and a keyboard power cable for laptop portability.

The RadioPort/Parallel Wireless LAN Adapter costs $599.

▶ *Alps Electric*
3553 N. First St.
San Jose, Calif. 95134
(408) 432-6000

LAN software

The Wollongong Group, Inc. has announced Release 2.0 of PathWay Client NFS for DOS/Windows, which provides enhanced support for CD-ROM disk drives, expanded network printing services, support for PCNFSD 2.0 and linked file systems support.

According to the company, the product's enhanced performance for network printing is 14 times faster than Version 5.0 of Sun Microsystems, Inc.'s PC-NFS. PathWay Client NFS supports DOS 6.0 and can automatically locate which NFS Servers are available on the network and display which file systems can be mounted by the NFS Client, the firm reported.

A single-user license of PathWay Client NFS 2.0 costs $265.

▶ *The Wollongong Group*
1129 San Antonio Road
Palo Alto, Calif. 94303
(415) 962-7100

Workgroup software applications

NetManage, Inc. has announced it will start porting its Network File System (NFS) client and server software to Microsoft Corp.'s Windows NT.

Windows NT users will be able to access files from any other computer on the network that has an NFS server, the company said. The NFS functionality will be available during the third quarter as part of ChameleonNFS32.

ChameleonNFS32 is an application package for Transmission Control Protocol/Internet Protocol communication on Windows NT.

The NFS functionality will cost $595.

▶ *NetManage*
20823 Stevens Creek Blvd.
Cupertino, Calif. 95014
(408) 973-7171

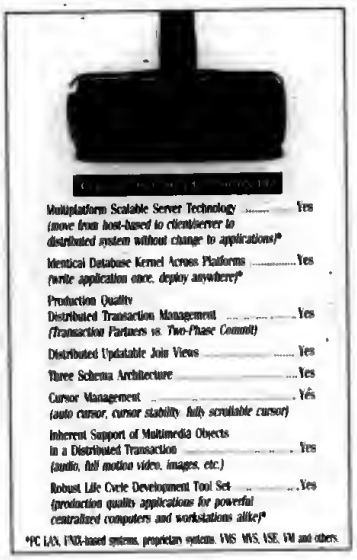
Envoy Systems Corp. has introduced the SalesMate Team Selling System, an integrated software system designed to extend workgroup concepts to mobile professionals and sales teams of 25 or more by coordinating team communications, linking remote users to corporate information systems and providing shared information access and entry.

The SalesMate Team Selling System uses both laptop-based software and the company's central-computer Sales Information Center software.

The SalesMate Team Selling System costs $1,925 per user.

▶ *Envoy Systems*
400 Fifth Ave.
Waltham, Mass. 02154
(617) 890-1444

For enterprise-wide implementation of client/server systems, a powerful, fully featured database management system is an absolute must. SUPRA® SERVER, from Cincom, is a truly open, scalable database server designed from the ground up to deliver the full benefits of client/server computing across a full range of requirements. Other client/server database systems will eventually "hit the power wall" in the large scale use demanded by enterprise-wide implementations. In contrast, SUPRA SERVER has been built on 25 years of mission-critical database experience to deliver the robustness your business needs. In other words, the power is inherently available when and where you need it.



Multiplatform Scalable Server Technology *(move from host-based to client/server to distributed system without change to applications)**	Yes
Identical Database Kernel Across Platforms *(write application once, deploy anywhere)**	Yes
Production Quality Distributed Transaction Management *(Transaction Partners vs. Two-Phase Commit)*	Yes
Distributed Updatable Join Views	Yes
Three Schema Architecture	Yes
Cursor Management *(auto cursor, cursor stability, fully scrollable cursor)*	Yes
Inherent Support of Multimedia Objects In a Distributed Transaction *(audio, full motion video, images, etc.)*	Yes
Robust Life Cycle Development Tool Set *(production quality applications for powerful centralized computers and workstations alike)**	Yes

*PC LAN, UNIX-based systems, proprietary systems, VMS, MVS, VSE, VM and others.

SUPRA SERVER provides a common database serving PCs, UNIX workstations, Macs, VAXs, mainframes and others...all with an identical single system image.

And SUPRA SERVER's Three Schema Architecture insulates applications from the complexity of your client/server or distributed computing environments. And all with the ease of use of desktop LAN DBMSs. Plus SUPRA SERVER delivers the power, dependability, security, and crashproof recovery capabilities of a robust, industrial-strength RDBMS. And you can choose from a wide-ranging and ever-growing list of powerful implementation tools, including Cincom's AD/Advantage®, a complete client/server application generation system. CINCOM SUPRA SERVER, the open database server for the new class of applications—available today. See just how powerful, and cooperative, your database server really could be. Should be. And eventually must be. Call now for a free SUPRA SERVER video and power package.

CINCOM SUPRA SERVER

For Your Free Video, Call 1-800-543-3010 Today.
Outside The U.S., Call 1-513-662-2300.

CINCOM.
The Smart Choice®

© 1993 Cincom Systems, Inc.

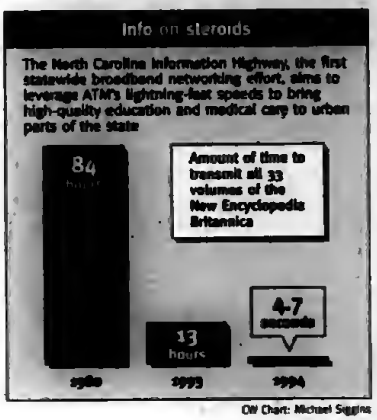
State paves way for 'highway'

By Joanie M. Wexler
RALEIGH, N.C.

■A microcosm of the federal government's vision of an information superhighway is under construction in North Carolina.

Last month, the state committed to becoming a customer of Asynchronous Transfer Mode (ATM) services across a statewide Synchronous Optical Network (Sonet) infrastructure. About $4.4 million has been requested in the government's capital budget next year for bringing up the first 104 sites, and statewide service is expected by mid-1994.

State government officials will conduct their own business across the network in an effort to streamline their work and speed up the criminal justice system. However, a major government goal is to provide interactive communications to schools, hospitals, businesses and homes throughout North Carolina, according to the governor's office.



CW Chart: Michael Siggins

Demand is key

The state's large contractual commitment to these services is motivating the three local telephone companies in North Carolina to accelerate deployment of broadband networks. Assurance of customer demand is a key element in spurring new high-speed network services in general; for instance, the absence of perceived demand was a pitfall with the slow-to-ripen Integrated Services Digital Network (ISDN).

"We were going to build the infrastructures gradually anyway," said BellSouth Telecommunications spokesman Clifton Metcalf. "But having a guaranteed large customer such as the state" is stepping up progress.

BellSouth is installing ATM switches from Fujitsu Network Switching of America in its nine-state region; five switches will fall in North Carolina under the auspices of BellSouth's Southern Bell operating company. The other carriers involved in the project are GTE Telephone Operations and Carolina Telephone.

The government's major goal is to equalize opportunities throughout the 600-mile-wide state, which is largely rural, for educational and medical services, according to the governor's office.

"A young person in a rural coastal county will have the chance to learn calculus from a top teacher in the state, and an elderly resident in the mountains can get consultation with a top medical specialist in another part of the state," Gov. James B. Hunt said in a prepared statement.

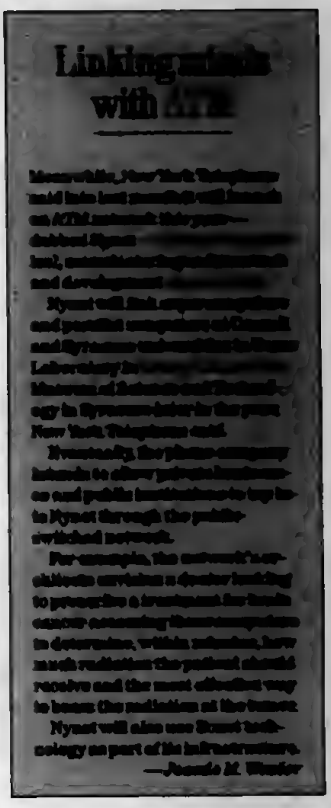
Medical pilot

One pilot under way now, for example, is a link between North Carolina Memorial Hospital and MCNC, a Research Triangle Park computer center that houses a Cray Research, Inc. supercomputer. Physicians, for example, can speed medical images to the Cray, which then quickly feeds them results about potential treatment scenarios, a state spokesman explained.

Applications for ATM services tend to be image- and video-oriented, as ATM is optimized for the delay-sensitive nature of such traffic.

Sonet is a fiber-based standard for a networking infrastructure that can carry multiple high-speed telecommunications services such as ATM, frame relay and ISDN. The aggregate speed potential of Sonet today is in the 2G bit/sec. range, with no maximum theoretical limit.

Bringing broadband networking to North Carolina could also help the state's economy, a source at the governor's office said. He said that when companies are considering bringing industry to the state, the communications facilities in place statewide have a large impact on their decision-making.


Linking minds with data

Meanwhile, New York Telephone said late last month it will launch an ATM network this year—dubbed Synnet—[illegible] and development.

Synnet will link supercomputers and parallel computers at Cornell and Syracuse universities in Upstate Laboratory in [illegible] Museum of Science and Technology in Syracuse, later in the year, New York Telephone said.

Eventually, the phone company intends to allow private businesses and public institutions to tap into Synnet through the public switched network.

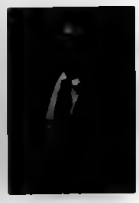
For example, the network's capabilities envision a doctor looking to prescribe a treatment for brain cancer accessing three-dimensional images to determine, within minutes, how much radiation the patient should receive and the most effective way to beam the radiation at the tumor.

Synnet will also use Sonet technology as part of its infrastructure.

—Joanie M. Wexler

Gary H. Anthes

All eyes on Clipper



If any conclusion can be drawn from the cacophony of conflicting views put forth at a recent public hearing on government-sponsored encryption technology, it is that the Clinton administration should slow down and take a closer look at Clipper.

Clipper is the government's attempt to give law enforcers the ability to unscramble coded messages from suspected criminals while guaranteeing constitutional safeguards to legitimate users. To do that, a secret algorithm embedded in a chip will use encryption/decryption keys maintained "in escrow" by two government-approved agencies and subject to use in wiretaps only via court order.

The first image brought to mind when presented with the key-escrow concept is that of a digital Big Brother, able to siphon off electronic secrets from anyone not in favor with the establishment. Stanford University Professor Martin E. Hellman says former Attorney General John Mitchell was in the habit of handing down blank but signed wiretap authorizations, 40 to 50 at a pop, rather than personally reviewing each request as required by law. "Two escrow authorities do little good if only one court order is required," Hellman contends.

Anthes, *page 74*

Software checks UPS pulse

By Elisabeth Horwitt

While many corporations have been working hard to set up centralized management of their remote network installations, users have only begun to address the need to centrally monitor the status of the electrical systems their computers and networks rely on. Uninterruptible power supply (UPS) vendors are beginning to address this need by providing software that allows a central console to monitor the status of a UPS and its battery backups.

A growing number of offerings also perform "managed shutdowns," which ensure that files are stored and I/O queues cleared before a workstation loses its power. Managed shutdowns are helpful to companies that turn off a building's power at night, and they help save files before a workstation runs out of battery power during a protracted blackout.

Another promising development is growing UPS industry support for the Simple Network Management Protocol (SNMP).

American Power Conversion, Inc., for example, offers a Microsoft Corp. Windows-based application that manages its UPSs via SNMP. The application provides features such as unattended data protection, central management, tracking of power data for diagnosis and the setting of scheduled tests.

Product announcements

More recently, Exide Electronics Group, Inc. in Raleigh, N.C., announced products for centrally managing its UPSs on remote sites:

- OnliNet 3.0 Basic Software reportedly enables a workstation to monitor its own UPS to track power conditions and performance. It also provides automatic CPU shutdown in the event of a power loss. Versions support Unix, Novell, Inc. and OS/2-based applications. It is priced at $189.
- OnliNet Basic Plus networking software allows a single workstation to monitor multiple UPSs across a Token Ring or Ethernet local-area network.
- OnliNet Network is Exide's proprietary application for monitoring multiple UPSs across a LAN or wide-area network. It allows the user to

UPS pulse, *page 78*

Anthes

CONTINUED FROM PAGE 73

The government has done little so far to put those fears to rest or to justify its own position. A parade of witnesses spoke out — mostly against Clipper — at the two-day hearing at the National Institute of Standards and Technology (NIST). No law enforcement officials showed up to say why we should entrust keys to our most sensitive communications to unknown parties.

The U.S. Department of Justice reports that out of 14 million arrests made in the U.S. in 1991, 3,000, or just .02%, resulted from 856 court-approved wiretaps. A conclusion drawn by some opposing Clipper is that wiretaps make a minuscule contribution to U.S. justice and are therefore not worth much sacrifice.

However, a summary of some of those wiretaps, provided by the Federal Bureau of Investigation, might cause even the most wary to warm up a little to Clipper:

- A wiretap led to the arrest and conviction of a "sexually deviant serial murderer" who had operated in New Jersey and New Mexico.
- Another wiretap enabled authorities to thwart Chicago's "El Rukns street gang" from a Libyan government-sponsored attempt to shoot down a U.S. commercial airliner with a military weapons system.
- The entire leadership of the Mafia's Colombo family was convicted with the help of wiretaps.

Power of persuasion

Federal law enforcement and intelligence officials have obviously convinced the president that Clipper is a good idea; they have been far less effective in convincing the public it should pay a price to guard against serial murderers, terrorists and drug dealers.

The government might well profit from a 12-month hiatus while it looks at some of the ideas that came up at the NIST hearing. For example:

- MIT Professor Silvio Micali outlined a key-escrow alternative to Clipper that he said meets all of Clipper's objectives with far fewer drawbacks.
- Sandra Lambert, vice president and information security manager at Citicorp, suggested that presumptively honest users such as banks be allowed to keep one of the escrowed keys while the government holds the other.
- A number of vendors and users are calling for a software implementation of Clipper, which would be cheaper, easier to interface with other systems and faster to swap out if a security compromise occurs. The feds say officially they do not know if that is possible, then admit they do not want a software implementation because the bad guys could close the back door by deleting a few lines of code.

Hellman has an ingenious idea that might appeal to those concerned about civil liberties. He would require not one but three judges to authorize a Clipper wiretap. A judge could answer the request with "Yes," "No" or "Oh, my God!" The latter means, "This looks like an attempted abuse of power, as in Watergate."

If a Clipper tap request got even one "Oh, my God!" decision, the target of the wiretap would be notified. Because that is the last thing the requester would want, it would serve as a powerful check on frivolous or improper requests.

Anthes is *Computerworld*'s Washington, D.C., senior correspondent.

Package automatically puts faxed data into host apps

By Lynda Radosevich
SUNNYVALE, CALIF

■ Harvest Software, Inc., a small company that in the past has offered fax services, recently introduced software that automatically enters data from faxed forms into host transaction applications.

The Harvest software could fill a niche in the electronic data interchange market by giving large corporations a method for letting their smaller mom-and-pop trading partners send electronic forms using their fax machines, said David Taylor, vice president of electronic commerce strategies at Gartner Group, Inc., a market research firm in Stamford, Conn.

The Harvest software receives faxed forms and extracts data using character recognition techniques. The software then enters it directly into the host transaction application and faxes back a response with data from the host, if needed.

Because the forms are prefabricated and the recognition software knows what to expect, recognition accuracy is higher than in typical optical character recognition systems, Taylor said.

The software runs under IBM's OS/2 on Intel Corp. 1486-based servers and integrates the fax with transaction applications operating on IBM mainframes. The company said it also plans to support IBM Application System/400 applications this year.

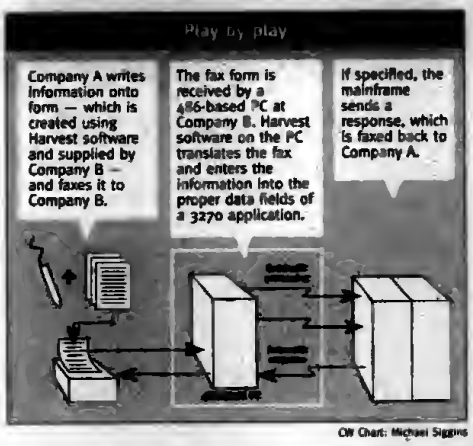
The software comes in two modules. One is a set of graphical tools that allows users to build forms that map directly to data fields in IBM 3270 forms. Another includes features such as audit trails, report generators and rules for sending forms to a PC for human verification.

One major advantage of the software is that it reduces labor costs for data entry, said Pervez Qureshi, Harvest's vice president of marketing.

For example, Boise Cascade Office Products, a nationwide office supply distributor based in Itasca, Ill., found in a beta test that it could process 40 orders per hour using the Harvest software rather than the 16 per hour using manual methods.

"Before, we needed people to pull faxes off the machine, sort, distribute, enter, check. . . . With the software, we automated the entire 11-step process," said Pat Ware, director of technology services at Boise Cascade.

Ware estimated that 40% of the 20,000 orders the company receives each day arrive by fax. The company hopes to get 10% of its customers using the Harvest fax forms within a year, which would translate to roughly 200,000 forms being processed automatically per year. At that rate, Ware said, payback on the system would take less than six months.



Off Chart: Michael Siggins

The Harvest software is shipping now and costs $35,000 for both forms-building and operations modules.

E-mail integration

Wingra adds Notes/CC:Mail to E-mail switch

By Lynda Radosevich
ATLANTA

Wingra Technologies, Inc. will announce this week that it will add support for Lotus Development Corp.'s Notes messaging software to its electronic-mail integration software. The company will also announce a module that provides directory synchronization between Lotus' CC:Mail package and Digital Equipment Corp.'s directory service. Both additions will ship in the fourth quarter.

Faster than a speeding bullet...

E-mail is one of the fastest growing applications in the computer industry, with a growth rate of 36% from 1991-92, according to Wingra.

The new pieces fit into Wingra's Missive E-mail integration software for DEC's VAX minicomputer. Introduced in February, Missive acts as a switch, interconnecting mail from disparate local-area network or host-based systems. The switching alleviates the need to maintain multiple computers with point-to-point E-mail translation software, said Ronald Rassner, director of technology research at Wingra.

For example, Mantech International, Inc., a government contractor in Fairfax, Va., has been using the Missive software for roughly two months to link 600 people using CC:Mail on Novell, Inc. NetWare networks to 200 people using DEC's VAX/VMS Mail.

Additionally, the software will allow the company to integrate other mail systems, such as those based on Novell's messaging technology, said Steve Berlin, systems technical director.

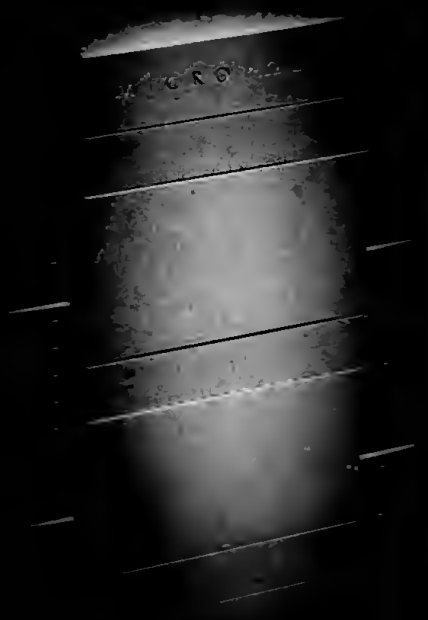
However, administering the name and address directories is no piece of cake. Currently, Berlin said he must manually enter name and address information from VAX/VMS Mail into the CC:Mail directory, a "cumbersome process that I'd be very interested in automating." In that light, the new CC:Mail to DEC Distributed Directory Service module "looks very interesting," he said.

In addition to the new Notes and CC:Mail modules, Wingra offers Missive modules to Novell's Message Handling Service-compatible E-mail, WordPerfect Corp.'s Office, Unix Simple Mail Transport Protocol, Microsoft Corp.'s Mail, DEC's E-mail networks and IBM mainframe and midrange E-mail. Wingra said it will ship a link to Microsoft's Mail by the end of the year.

Mantech chose Missive over software from E-mail integration heavyweight Softswitch, Inc. because Missive "was simpler and more straightforward," Berlin said.

Pricing for Missive starts at $7,500 for the base software, plus $3,000 for messaging modules and $10,000 for the directory synchronization module.

RAIDION
Fault-Tolerant Disk Arrays



MICROPOLIS

NetWare 3.11 and 4.0

Networking Experts Agree:
RAIDION IS A WINNER

Corporate Computing *"The Micropolis Raidion was our overall winner with an impressive combination of high performance, low cost, and unparalleled expandability."* May, 1993

BYTE *"The Raidion's low price alone makes it worth considering."* August, 1992

NETWORK COMPUTING *"We've evaluated many RAID products over the past six months, and from what we've seen, Micropolis' RAIDION is probably the most modular RAID 5 scheme now on the market."* June, 1992

LAN *"The Raidion array had the most thorough documentation of the tested drives. The Raidion software was the most robust, as well."* June, 1992

PC WEEK *"PC Week Labs found that the array performed admirably - successfully backing up data and easily restoring it upon drive failure."* May 25, 1992

LAN TIMES *"It was a breeze to integrate and didn't add any overhead to installation time... Micropolis has done an excellent job on a great product."* May 25, 1992

Take it from the industry's leading publications: when it comes to reliable, cost effective, fault-tolerant data storage, there isn't another disk array like RAIDION.

You won't find another array as easy to grow with either; a basic RAID 5 array can be expanded, module-by-module, up to 32 modules, totaling 93 Gigabytes. No wonder RAIDION has become the array of choice for networks running Novell NetWare 3.11 and 4.0.

Call 1-800-395-3748 to get the latest word on RAIDION in our new brochure and the name of your nearest Micropolis Authorized Distributor.

yes NetWare Tested and Approved

How to go client/nano

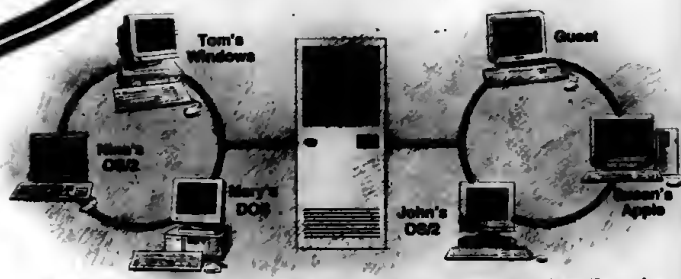
Now, it couldn't be easier to bring the IBM AS/400,® the midrange computer of choice, to the desktop system of your choice.

Introducing the IBM AS/400 Client Series,™ client/server software for end users and application developers. Whether you're running seven client PCs, or seven hundred, making the move to client/server computing is easy. Because the software is already preloaded and pre-configured to your specifications when you receive the AS/400 hardware.

And if you're one of the 200,000 to whom AS/400s have already been shipped, you can get a single package of software that loads right into your system. So you can concentrate on your job, not on your computer.

If you're running OS/2,® Windows,® Apple's System 7, or even good old DOS, your job will be easier. You'll be able to take advantage of programs such as Rumba/400 and SNA·ps 5250, which let you operate your business applications with a mouse. And ShowCase™ VISTA, which lets you query the AS/400's database and view the results graphically. Plus Personal AS for decision support.

If you're a developer, your job will be easier, too. You'll have popular tools, including Progress/400,™ SQL Windows,® and Synon/CSG.® There's also ENVY/400® for object-oriented development, and TRACK for Executive Information Support, all helping you develop and run mission-critical applications from your desktop.



Whether you're working in OS/2, Windows 3.1, Apple or DOS, AS/400 Client/Server lets you get to data and applications anywhere in the network.

*Source: International Data Corp. IBM, AS/400 and OS/2 are registered trademarks and Progress/400 and Client Series are Apple Computer, Inc. ShowCase is a trademark of Rochester Software Connection. SQL Windows is a registered trademark

AS/400

Client Series

server

But you'll also get more than just the open advantages that come with client/server computing.

You'll also benefit from the advanced capabilities of the award-winning AS/400. Every AS/400 comes with an integrated relational database, enhanced security, impressive networking capabilities and outstanding systems management. These features, combined with over 20,000 proven commercial applications, have made the AS/400 the world's most popular midrange system.

What's more, the AS/400 is very affordable, with

in a

the lowest five-year cost of ownership in its class.*

As always, you'll get superior IBM service and support, including a 24-hour hotline, to help keep the mission-critical applications your business depends on, up and running.

No matter what your hardware, you'll be able to maintain all your network business connections with AS/400 Client/Server.

It's for reasons like these that successful companies such as Mannington Carpets and Louis Dreyfus Energy have already chosen the AS/400 for client/server applications.

For more details on the IBM AS/400 Client Series, call 1 800 IBM-CALL, ext. 102B.

But hurry. You're losing valuable nanoseconds.

second.

Success isn't complicated.

IBM

trademarks of International Business Machines Corporation. Windows is a registered trademark of Microsoft Inc. Apple, System 7 and SNA.ps 5250 are trademarks of of Gupta Corp. Synon/CSG is a registered trademark of Synon Corp. ENVY/400 is a registered trademark of Object Technology International, Inc. © 1993 IBM Corp.

UPS pulse check

CONTINUED FROM PAGE 73

shut down any remote workstation running OnliNet network software. It can also manage Exide UPSs equipped with SNMP agents. The product costs $299.

•OnliNet SNMP collects information about Exide UPSs via SNMP and then passes the information to an SNMP-compatible network management platform such as Hewlett-Packard Co.'s OpenView. It is priced at $349.

•OnliNet Lite sits on a workstation that does not require power monitoring and communicates with OnliNet Network or OnliNet SNMP to provide automatic shutdown. It is priced at $129.

Preventive measures

Exide's ability to manage UPSs from a central location, using SNMP, had a lot to do with Walgreen Co.'s decision to implement the company's UPSs, according to Bill Greenhaigh, technical analyst at the Deerfield, Ill.-based retail chain. The company wanted a way to check the status of its UPSs and battery backups so it could catch a problem before a system lost its power, Greenhaigh said.

However, each store already has five telephone lines installed to monitor systems such as fire and burglar alarms, and Walgreen has more than five applications that can use those lines.

With Exide's OnliNet SNMP, Walgreen can monitor each store's UPS and battery backup from a central site over existing satellite lines that carry point-of-sale and other data. This eliminates the need to install another telephone line.

The SNMP support also enables Walgreen to integrate UPS monitoring with the SNMP network mangement system it plans to implement, according to Greenhaigh.

Unfortunately, a standardized SNMP management information base for UPSs is still some months down the road, an Exide spokesman said. As a result, one UPS vendor's SNMP-based system will not necessarily manage another vendor's UPSs.

Another recent announcement is Network Security Systems, Inc.'s LanSafe II for Unix, which is said to manage that company's UPSs on Unix workstations across heterogeneous network environments.

The product incorporates an X Window System and the Open Software Foundation's Motif graphical user interface, providing network administrators with the status of all power protection components on the network, and it identifies potential power problems, the San Diego, Calif., vendor said.

Pull-down menus provide the ability to change power settings, conduct networkwide tests, reboot or shut down nodes and view historical power event logs.

The system will also perform managed shutdown of the Unix network when a prolonged power outage occurs.

The product supports The Santa Cruz Operation, HP, NCR Corp., Sun Microsystems, Inc. and Digital Equipment Corp. Unix platforms. It is priced at $149 for the single-seat version.

Skirting disaster

UPS management systems avoid major power disasters in the following ways:

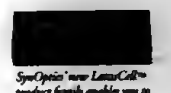
When a UPS battery wears down: The system identifies the problem before it becomes critical. It sends out a maintenance person or automatically drains and recharges the battery.

When there is unscheduled power-off period: The system ensures that files are stored and I/O ports cleared before a workstation is turned off.

When an unscheduled, prolonged power outage occurs: The system notifies the network manager of why certain system failures are occurring, and the manager performs a managed shutdown of workstations with managed UPSs, saving files before their batteries run out of power.

SynOptics smoothly inte into your exist

An enterprise network is one of your business' strategic assets. And with the constant arrival of new network technologies, you need a partner to help you merge and manage both the old and the new. That partner is SynOptics.

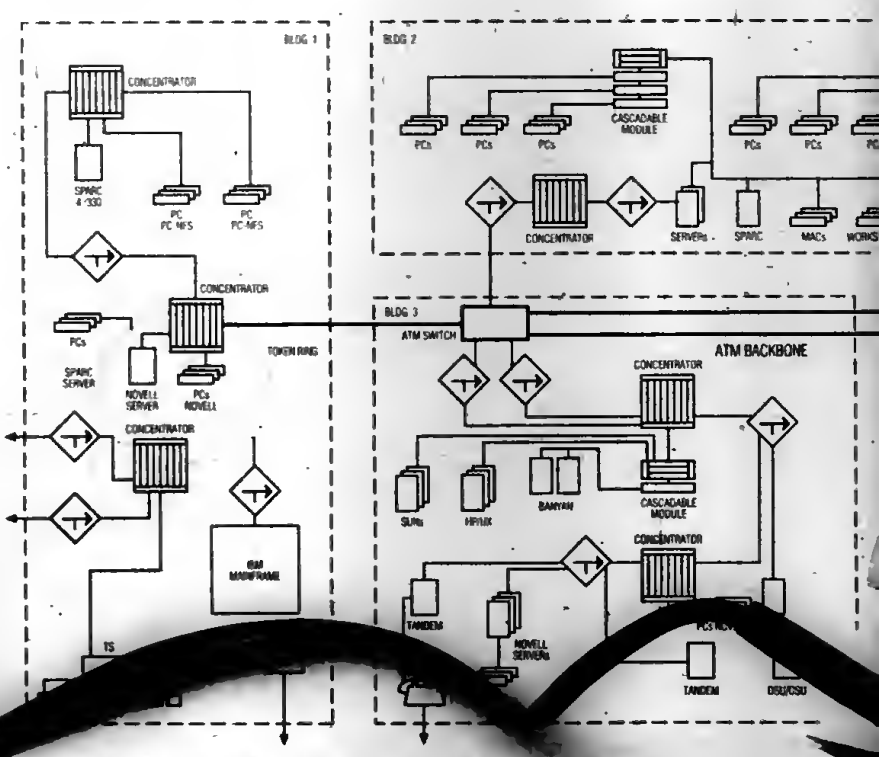


SynOptics' new LattisCell™ product family enables you to build a complete ATM network, from corporate backbone to desktop connections.

Since the beginning of the intelligent hub revolution, SynOptics has smoothed the transition to new network technologies—from network management, to the first multi-protocol hubs integrating Ethernet, Token Ring and FDDI topologies.

Now SynOptics takes you one step further, with the creation of a cohesive network fabric—an underlying structure that connects and manages individual technologies through the intelligent hub. It provides high-speed network communications. And it's flexible enough to grow as your network does, without sacrificing your existing investment.

When you demand new Asynchronous Transfer Mode (ATM) technology, SynOptics has it. LattisCell,™ our second-generation ATM solution, greatly increases performance both on the backbone and on the



©1993 SynOptics Communications, Inc. LattisCell and Optivity are trademarks of SynOptics Communications, Inc.

[redacted]

Host-to-host

McData Corp. has announced the LinkMaster 9134 Serial/Parallel Converter.

The company said the product is the first non-IBM Escon converter.

The LinkMaster 9134 has the ability to translate between parallel signals carried over bus and tag cables and serial signals carried over fiber-optic cables.

Users can integrate their existing parallel I/O equipment into an Escon network environment, according to the company.

The LinkMaster 9134 costs $12,000 per unit.

▶ *McData*
310 Interlocken Pkwy.
Broomfield, Colo. 80021
(303) 460-9200

Network management

Tekelec has announced the Chameleon Open protocol analyzer for integrated, simultaneous testing of local-area network and broadband wide-area network interfaces and applications.

According to the company, the Chameleon Open is a protocol analyzer based on the Open Diagnostic Access Architecture. Application modules support both LAN and WAN interfaces and protocols, including Ethernet, Token Ring, Switched Multimegabit Data Services at T1 and T3 speeds and T1/E1 WANs such as Primary-Rate Interface, Integrated Services Digital Network, X.25 and frame relay.

Application modules can be used in any combination.

Prices for the Chameleon Open range from $22,000 to $45,000.

▶ *Tekelec*
26580 W. Agoura Road
Calabasas, Calif. 91302
(818) 880-5656

Gateways, bridges, routers

Proteon, Inc. has announced the DNX 300N Bridging Router, a "plug-and-play" product that was designed for Novell, Inc. users who need low-cost access to remote Ethernet local-area networks running the Internet Packet Exchange protocol.

Available in two configurations, the DNX 300N is a 386-based router that has flash memory and includes all the necessary software, hardware and cables, including bridging and routing software. The DNX 300N supports one LAN-to-LAN connection or connects two wide-area networks to one LAN.

The product offers a router configurator, an LED-based interface, flash-memory upgrades, a customizing configurator and a quick reference guide.

Prices range from $3,995 to $5,495.

▶ *Proteon*
9 Technology Drive
Westboro, Mass. 01581
(508) 898-2800

Computer Network Technology Corp. (CNT) has announced a new data tunneling capability for its channel networking systems.

According to the company, the capability enables users to send data from an assortment of communications devices, such as front-end processors, bridges and routers, over the CNT network with improved performance and a lower cost than existing connections.

Data goes into the CNT system from either V.35 ports with speeds of up to 4M bit/sec. or High Speed Serial Interface connections at speeds of up to 52M bit/sec., the company reported.

Prices for the product range from $5,000 to $20,000.

▶ *Computer Network Technology*
6500 Wedgewood Road
Maple Grove, Minn. 55311
(612) 550-8000

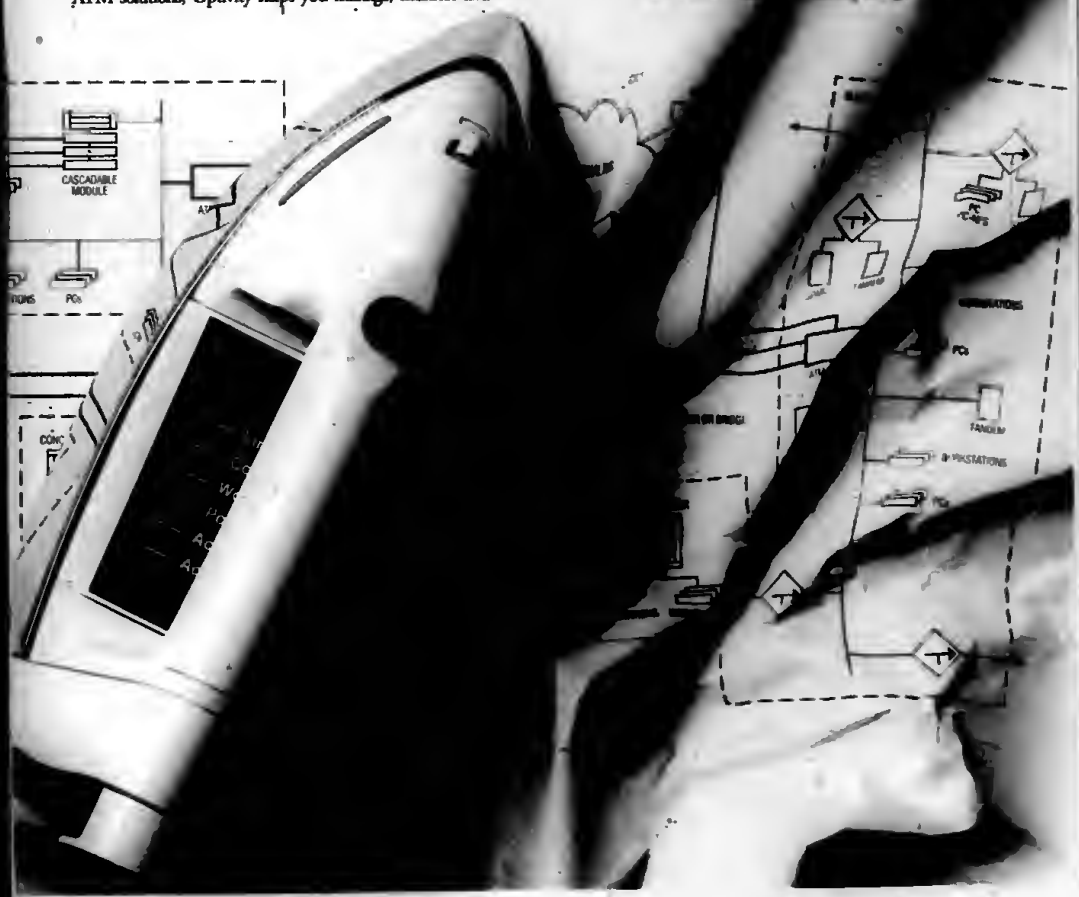
grates new technologies ing network.

desktop. Plus, our complete family of LattisCell products is integrated into a powerful silicon chip set, offering you a significant cost advantage.

SynOptics integrates hardware and software, delivering unparalleled capabilities to manage your network as a single-system solution. Optivity™ network management software gives you the visibility to control connectivity, bridging and routing functions from a single management station, or diagnose problems that may encompass more than one element of the network. Working with SynOptics' ATM solutions, Optivity helps you manage, monitor and diagnose problems across the entire network fabric.

So if you're building or managing an enterprise network, get the wrinkles out with our integrated solutions. Call 1-800-PRO-NTWK for our Solutions Kit on ATM, including our just-released white paper "The Roadmap to ATM Networking." Because at SynOptics, we're smoothing the way for the network of the future.

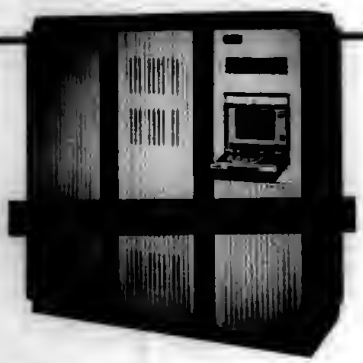
SynOptics
The Network [illegible] Computing

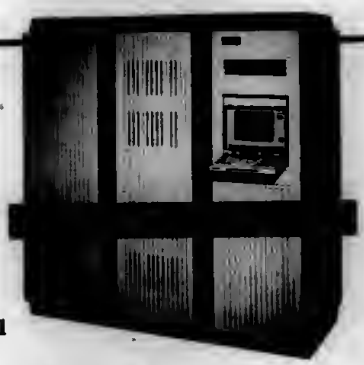


DO YOU SELL SOLUTIONS?
Advertise your hardware and software solutions in Computerworld's weekly Solutions Directory. Rates start at just $499 for 26 weeks.
800-343-6474
x744

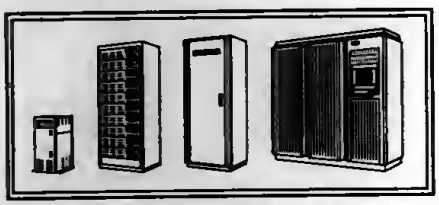
Life is full of tough choices: A performance car vs. a practical car. A job that satisfies your pocketbook vs. one that satisfies your mind. A disk storage solution that offers speed vs. one that offers complete data availability. Well, the last choice just got easier to make. Because, right now, there's the Symmetrix 5500 ICDA™ from EMC.

The disk storage system on the left is known for speed. The disk storage system on the right is known for continuous operation. Fortunately, they're one and the same.





On one hand, the Symmetrix 5500 is fast. It's based on EMC's Integrated Cached Disk Arrays (ICDA™), which means it can access information on an IBM or compatible mainframe computer almost as fast as you can say "Where's my data?"



The Symmetrix 5500 is part of an entire line of disk storage systems based on EMC's Integrated Cached Disk Arrays (ICDA™).

On the other hand, the Symmetrix 5500 offers continuous operation. Which means you'll have access to your data 24 hours a day, seven days a week, with no costly downtime.

But the benefits of the Symmetrix 5500 don't end there. It also offers high capacity per square foot, low power and cooling requirements and a two year warranty that all add up to a maximum return on your storage investment.

So if you can't choose between a disk storage solution that offers speed and one that offers continuous operation, don't. Get the Symmetrix 5500. To learn more, please call 1-800-424-EMC2, extension LM65C.

It's one of the few instances in life where you truly can have the best of both worlds.

EMC²
THE STORAGE ARCHITECTS

EMC, Symmetrix, Integrated Cached Disk Arrays and ICDA are trademarks of EMC Corporation. IBM is a trademark of International Business Machines Corporation.

IBM beefs up systems management line

By Johanna Ambrosio

IBM earlier this month announced software designed to play in the distributed systems management arena. One package allows customers to schedule jobs on non-IBM machines, including those that run Unix.

Another package, the brand-new Enterprise Performance Data Manager (EPDM), provides a way to collect information from various MVS components — including the operating system, RACF security package and CICS transaction processing manager. Customers can use this data to analyze historical information about resource use and to project trends.

Although EPDM runs only under MVS, it also accepts information about VM use.

Some differences

Kidder, Peabody & Co. in New York helped beta-test EPDM and has been using it for a couple of months, according to Tom Kopera, assistant vice president. He said Kidder is slowly phasing it in and primarily still uses EPDM's predecessor, Service Level Reporter (SLR). The primary difference is that EPDM stores data in a DB2 information base, whereas SLR uses VSAM. Also, EPDM sports a graphical user interface and SLR does not.

So far, Kopera said, EPDM is proving much easier to use. "With SLR, even the canned reports took me two months to set up. There was a lot of hair on the floor with that one."

With EPDM, on the other hand, "it's easy to generate reports if you know SQL." The most time-consuming portion is the conversion process needed to get the reports from the old SLR format to the new EPDM one, Kopera added.

Scheduling options

IBM's other major announcement was a new release of its Operations Planning and Control (OPC)/MVS package. With it, users can schedule jobs on computers including IBM mainframes, the Application System/400 and most Unix-based machines and computers from Tandem Computers, Inc. and Unisys Corp.

"It's the first step in addressing the distributed world," said Leif Engdahl, technical program manager at IBM's Nordic Laboratory in Lidingoe, Sweden. He said future releases of EPDM may come for Unix and the AS/400 environments.

Igor Stenmark, an analyst at Gartner Group, Inc. in Stamford, Conn., said the availability of OPC on non-IBM platforms "sounds interesting. If it's really able to manage those environments, it could be a serious player" in the market for distributed job-scheduling packages.

Another piece of the announcement was a new version of IBM's mainframe chargeback package, called AccountingManager/MVS. IBM eliminated the need for customers to have Query Management Facility (QMF) as the reporting tool. "Now they can use whatever reporting tool they wish," Engdahl said. He added that the QMF prerequisite in other IBM systems management products will "likely" be eliminated in future releases of those products.

User choices

IBM's systems management announcements included the following:

- A new MVS package to collect historical systems management data and produce graphs and reports.
- A new release of Operations Planning and Control that lets users schedule jobs in Unix-, Tandem- and OS/2-based machines, among others.
- Automated Network Operations for VM.

NCR taps Pentium for mainframe-class servers

By Thomas Hoffman
DAYTON, OHIO

Improved hardware price/performance and the inclusion of fault-resilient software are the catalysts behind the arrival of 10 new high-powered NCR Corp. System 3000 servers, according to users of predecessor systems.

NCR's 3-year-old 3000 line includes a new uniprocessor — Model NCR 3410 — and the 16-way, Intel Corp. Pentium-based NCR 3575. Four new I486-based machines fill gaps in NCR's scalable System 3000 product line, while the latest midrange Pentium-based servers push the line into the mainframe-class performance levels required to power high-volume, on-line transaction processing applications, analysts said.

"With the Pentium processor and added symmetric processing head room, NCR has clearly pushed its midrange performance target well into the mainframe class with the 3575," noted Peter Kastner, vice president at Aberdeen Group, a market research firm in Boston.

Speedy server

The NCR 3575 has been estimated to run at speeds approaching 1,500 million instructions per second (MIPS), based on reports given by Intel to NCR, according to Richard H. Arnold, an NCR assistant vice president of server marketing. The NCR 3550, an eight-way 486-based precursor to the NCR 3575, had been benchmarked to run at 400 MIPS, Arnold said.

The combination of Pentium processors — which are said to deliver up to twice the processing power of a 486 chip — along with the addition of NCR's LifeKeeper fault-resilient high-availability software, was well-received by System 3000 users at the information services department at the city of San Antonio.

Last year, the municipality tapped NCR for two System 3450 servers as part of a citywide computer-aided design (CAD) project being developed to speed the calls processed by the city's police, emergency medical services and 911 services operators.

Though the CAD application is being developed on an Amdahl Corp. 5860 mainframe, the city is planning to port the public safety system down to the NCR 3450s by the end of the year, according to Gary Miller, San Antonio's systems services manager.

Because the emergency system requires nonstop processing and quick response time, Miller said,

NCR, *page 84*

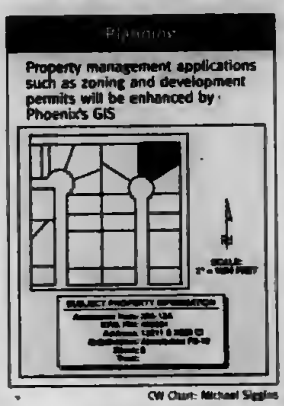
Geographic information systems

Phoenix maps out GIS plan

By Gary H. Anthes
PHOENIX

While the city of Phoenix improves its transportation, water and sewer systems, its information systems specialists are building an infrastructure of a different but related kind. It is a 5G-byte database of geographic information that will be able to pinpoint, display and describe every manhole, liquor store, one-way street, zone boundary and land parcel in a 400-sq-mile area.

The people building the geographic information system (GIS) infrastructure said more than 50 GIS applications have already been identified, and the end is nowhere in sight. "It's truly open ended. It is not an application like an accounting system," said William Bayham, GIS project manager. "This is more of a strategic information environment, or platform, to analyze and manipulate spatial data."



CW Chart: Michael Siggins

The city's GIS project got a jump start in 1988 with a $2 billion bond issue that earmarked $7.6 million for GIS over five years. Now the city is midway through a massive data-capture effort that involves digitizing paper maps that show water and sewer lines, land parcels, roads, zoning information and the like, all laid out in squares one quarter mile on each side.

In addition, the city is loading "attribute data," or text from map annotations and other sources that describes the spatial data.

The GIS applications are being built using GIS tools from Environmental Systems Research Institute, Inc. in Redlands, Calif. The company's Arc/Info combines cartographic and analysis capabilities with a database for input, management and display of spatial data. It also includes a specialized language in which to write GIS applications.

Some of the attribute data resides in Arc/Info's multimedia GIS database, and other information is stored in an Oracle Corp. database, which can be accessed by a SQL feature in Arc/Info.

The GIS applications are available to users on Token Ring local-area networks at various city locations, all connected by a fiber-optic backbone. The LANs support IBM RISC System/6000 and Sun Microsystems, Inc. Scalable Processor Architecture workstations and servers.

The backbone also connects to the city's IBM 3090 mainframe for access to systems and data there. For example, GIS users will be able to download crime data from police department systems to produce special maps highlighting crime trends and hot spots, Bayham said.

An application already running automates to a large degree the evaluation of liquor store license requests. Using census data, the GIS can

Phoenix, *page 84*

Maryfran Johnson
Senior Editor Workstations

Mark Halper
Senior Correspondent

Jean Bozman
Senior West Coast Editor

RELENTLESS, DETERMINED, COM

Relentless in the pursuit of the latest breaking news in IS.

Determined to dig deeper and work harder to uncover the stories that matter most to you.

Committed to the highest standards of excellence and integrity in journalism.

Focused on bringing you the IS information you need to know, when you need to know it.

Driven to cover it all — PCs, workstations, mainframes, client/server computing, networking, communications, open systems, languages, and more.

These are the qualities that distinguish the editors, writers, designers, and production staff of *Computerworld*. And they are the reason *Computerworld* is the newspaper of IS.

Week in and week out, the people at *Computerworld* cover the world of IS in greater depth and breadth than any

Photos: Al Fisher, Tom Zimberoff, 1990

Joanie M. Wexler
Senior Editor Networking

Alan Alper
News Editor

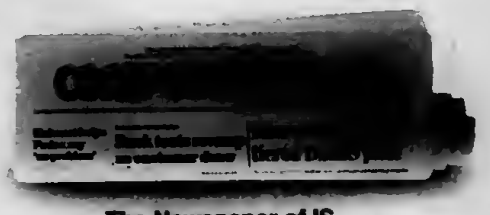
MITTED, FOCUSED, AND DRIVEN.

other publication. That's why over 138,000 IS professionals pay to subscribe to *Computerworld*. Shouldn't you?

Subscribe to *Computerworld* today and you'll receive 51 issues packed with everything you need to know to do your job better. And get an edge on the competition. Plus, you'll get our special bonus publication, *The Premier 100*, an annual profile of the leading companies using information systems technology.

Order today by calling us toll-free at **1-800-343-6474**. Or use the postage-paid subscription card bound into this issue. And get your own copy of *Computerworld*.

Then you'll see how a few relentless, determined, committed, focused, and driven people can make a difference.



The Newspaper of IS

Amdahl users ask for conversion assistance

By Martin LaMonica
BARCELONA, SPAIN

Amdahl Corp.'s recent European user group meeting brought renewed pressure for client/server migration solutions from the mainframe vendor and intense soul searching over the changing role of mainframe shops, information systems departments and business organizations in general.

During a question-and-answer session with top Amdahl executives, users voiced concern over whether the company could accelerate its efforts to supply open systems software in volume and provide the necessary support.

Source: International Data Corp., Framingham, Mass.

Several Amdahl users said in interviews that the mainframe is not dead, but they noted that users are looking for solutions other than boxes as the mainframe becomes a data repository in a distributed environment.

"The mainframe is just another server — a commodity, really. It still has to be cost-effective," said Sandy Hulbert, general manager of information management operations at British Airways.

The airline continues to run nearly all its management applications, such as payroll, flight planning and inventory, on 900 million instructions per second of mainframe hardware, including two recently purchased Amdahl 6850s. Nearly all smaller platforms installed for the office environment are linked to its central sites.

Amdahl Chief Executive Officer E. Joseph Zemke outlined a plan to cut costs internally and shift strained personnel resources to open systems development, support and consulting.

Last year, services and outside maintenance represented 7% of Amdahl's $2.5 billion in revenue, a percentage the company expects to double this year on flat or slightly lower revenue, Zemke said.

In general, users said they were satisfied with Amdahl's open systems migration contracts and its UTS operating system, which allows its mainframes to run Unix.

Anton Ratnayake, group general manager of information at UK-based global transportation company P&O Containers Ltd., said his company's open systems transition with UTS was smooth and relatively inexpensive. He called Amdahl's support "stable."

Ratnayake said he uses UTS to interconnect Sequent Computer Systems, Inc. Unix-based systems, IBM RISC System/6000s, an Amdahl 5890/300E running UTS, an Amdahl 5990-700 running MVS/ESA and an IBM Enterprise System/9000 running VM/CMS.

Positive tales

Other users portrayed Amdahl as a straightforward, trustworthy partner. UK-based retailer Tesco Stores Ltd. has been pleased with an Amdahl software development contract for its logistics management system.

"We had Amdahl invest in half of the project to ensure their commitment," said computer services director Joe Galloway. The shop runs its Amdahl 6650 and 4550 mainframes at 25% processor capacity per hour and intends to stay with them for some time, according to Galloway.

Amdahl emphasized its dedication to open systems by announcing plans to develop a common application development environment with its 45% owner Fujitsu Ltd. and UK-based vendor ICL Ltd., which is 80% owned by Fujitsu.

The joint project, due to bear fruit at the end of the year, will allow applications developed under Unix System Laboratories, Inc.'s Unix System V on one vendor's platform to operate on another vendor's similarly equipped machine, according to Amdahl officials.

The company also emphasized partnerships, particularly in parallel multiprocessing. Amdahl will announce a "moderately parallel" machine that will integrate between 25 and 35 64-bit processors in a "reasonable time frame," according to top officials.

LaMonica is a reporter for the IDG News Service.

The many faces of Huron

Users showed great interest in Amdahl's Huron application development environment, which provides a single interface for development on MVS, TSO, CICS, IMS/DC, UTS, AIX for RS/6000s and The Santa Cruz Operation's SCO Unix for Intel Corp. 1486 platforms.

Physical data can remain in proprietary databases IMS, DB2, IDMS or Model 204 accessed through servers or can be held in Huron's own data stores, officials explained.

Several users said Huron has accelerated development processes. UK-based Coca-Cola Schweppe Ltd. has seen two- to sevenfold productivity gains and savings of $450,000 by switching to Huron for DB2 on MVS.

David Jephson, director of personnel, organization and systems, did report a few problems that he considered normal for a new product, notably the lack of an SQL interface. Also, Huron cannot control the priority at which a Huron batch job or on-line transaction accesses DB2 and cannot select the DB2 access mode from within a Huron transaction, he said.

"The thing I like about Huron is that it's totally integrated. There's just one workbench, which is easy to learn because there are only about 20 commands," unlike most fourth-generation development tools that have several hundred, said Joe Galloway, computer services director at Tesco Stores. — *Martin LaMonica*

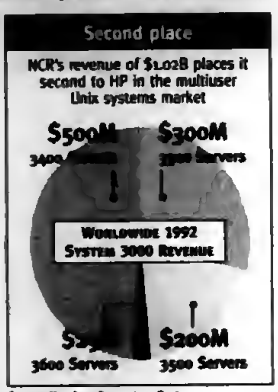
NCR taps Pentium for superservers

CONTINUED FROM PAGE 81

the city is extremely interested in both the Pentium systems and the LifeKeeper fault-resilient software. "As we move applications from our mainframe environment, or as new applications present themselves, we're interested in the fault-tolerant aspects due to the public service requirements that we have," Miller said.

Mainframe users have been steadily offloading mission-critical applications onto distributed platforms such as Unix. Analysts praised NCR's strategy to deliver fault-resilient software to protect those applications at a significantly lower price point than pricier Unix-based, fault-tolerant systems sold by Tandem Computers, Inc., Stratus Computer, Inc. and Sequoia Systems, Inc.

"We are seeing an increasing interest in the marketplace for high-availability systems for people who are not willing to pay the substantial price penalty for fault-tolerant systems," Kastner said, adding that IBM and HP also offer fault-resilient packages.



Source: Aberdeen Group, Inc., Boston

John Morrell, a research manager for Unix at International Data Corp., a Framingham, Mass., market research firm, placed NCR third in the Unix midrange systems market with 9% of the $9.3 billion pie, trailing IBM and Hewlett-Packard Co., respectively.

However, Morrell said the addition of the fault-resilient software with the Pentium processors will put NCR's System 3000 on par or ahead of its competitors from a price/performance and functionality standpoint, though he declined to forecast how the entries would affect NCR's market standing.

Phoenix GIS plan

CONTINUED FROM PAGE 81

quickly and accurately check for conformance to a host of rules that restrict the sale of alcohol near schools, churches and high-crime areas.

In another application, Bayham said GIS technology has reduced from five days to five minutes the time it takes to verify ownership and get other property data in order to respond to citizen complaints and questions about maintenance, zoning and environmental issues. The city used to have to pore through paper records at multiple sites in order to answer 22,000 such requests annually.

The city also uses the GIS environment to develop a system for routing garbage trucks, not an easy manual job when a truck has countless alternate routes overlaid by the constraints of one-way streets, rules against U-turns and the like. "We think we can automatically generate the optimum routes and print maps in an hour, eliminating person-months of effort and enabling the routes to be constantly fine-tuned," Bayham said.

Arc/Info includes a tool to aid route optimization, he said.

Other anticipated GIS applications include the following:

- Automatic notification of nearby property owners when someone applies for a zoning variance.
- Capacity planning and optimization based on modeling of water flows.
- Management of street maintenance.
- Processing and management of building permits.

City maps are now drawn independently by five departments: engineering, water, planning, city clerk and street transportation. They are then used by 14 departments for mission-critical functions.

Once the GIS architecture is in place, engineering will produce a baseline map, which is stored in the system once, Bayham said. Other views of the water system, for example, can be layered on top as specified by the user.

What's the difference between Interop and ComNet?

Interop is local.

ComNet is global.

Networking is the hot topic of the nineties, but who has time to go to a dozen networking trade shows?

The two big networking shows.
If you've got the time, you ought to be at both Interop and ComNet. If not, there's an easy way to decide which show is for you.

Interop is basically a local area network show focusing on technical "interoperability" issues. Important issues, to be sure, but not the big picture.

ComNet is a global internetworking show focusing on company-wide enterprise networking. It covers the latest technologies like ATM, Frame Relay, SMDS, FDDI, and mobile data communications that are shaping the new enterprise.

And deals with real-world solutions like imaging, voice, data, workgroup and database applications that are driving the technology.

Produced by IDG World Expo.
Furthermore, ComNet is produced and managed by IDG World Expo, the world-wide leader in professional conferences and expositions for the information technology industry... including ComNet Prague, EuroComNet and ComNet Korea. It is part of International Data Group (IDG), the leading global provider of information services on information technology.

IDG World Expo brings the full support of IDG publications including *Computerworld, Network World, Federal Computer Week, InfoWorld,* and *CIO* in providing exhibitors with the highest quality attendee promotion.

If your company is global, or thinking of going global, then ComNet '94 ought to be in your tradeshow plans. It makes good sense, since 45% of the people who went to ComNet last year already have multi-national networks.

Not just technical people.
ComNet is a show for decision-makers.

3Com's John Covert said, "What we're seeing are the principal network people who are really on the firing line, or the people who have to make the decisions for next-generation technology."

Jim Warner, marketing director for the Network Management Forum and frequent ComNet participant said, "At ComNet the quality of attendee is very high. The collective purchasing power of ComNet's enterprise network management audience is unsurpassed."

According to the latest independent audience surveys of the two shows, 47% of ComNet attendees are from companies that spent $1 million or more on networking equipment in 1992, vs. 36% for Interop Fall.

First show of the year.
Traditionally, ComNet is the launching pad for new networking products. At ComNet '93, half of the 450 exhibitors introduced 288 new products.

ComNet '94 will be held January 24-27, 1994 at the Washington Convention Center in Washington, D.C.

For information about exhibiting or attending, return the coupon or call **800-225-4698.**

☐ Send me **FREE ADMISSION** to over 450 exhibiting companies plus detailed information on global networking issues and solutions at the ComNet conference, January 24-27, 1994, Washington, D.C.

☐ Send me a **FREE EXHIBITOR KIT** with information on how to reach over 35,000 global networking decision-makers.

NAME _____

TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

COUNTRY _____

PHONE _____ FAX _____

Return to: ComNet '94, P.O. Box 9107, Framingham, MA 01701-9107.
Or Fax to: 508-872-8237. CW3

COMNET '94
Entering the Global Age.

CONFERENCE AND EXPOSITION
JANUARY 24-27, 1994 • WASHINGTON, D.C.

Bull takes systems integrators by the horns

As proprietary sales fall, Bull focuses on distributed computing software

By Craig Stedman
SILLEBICA, MASS.

Groupe Bull is putting together plans to market its distributed computing products to systems integrators, starting with the recently introduced first production release of a Unix-based system management software package built around Hewlett-Packard Co.'s OpenView management technology with extensions developed by Bull.

Sales of Bull's proprietary computers are declining: Overall revenue dropped from $5.9 billion in 1991 to $5.7 billion last year. In response, the French company is looking for "a more aggressive way of pushing" the Integrated System Management (ISM) software and unspecified other products grouped under its Distributed Computing Model (DCM), said Maurice Gervais, vice president of North American/Pacific products and systems at the Bull HN Information Systems, Inc. subsidiary here.

"We feel there is a broader market [than the existing Bull customer base] and that our products are quite competitive," Gervais said.

Marketing to systems integrators is already starting in Europe, Gervais added, and an expansion into the U.S. should follow "within a few months at the most."

ISM, in particular, is being counted on "to be a flagship product," Gervais said. The OpenView-derived software is eventually supposed to enable all parts of a multivendor enterprise to be managed from a single Unix system using common management facilities, according to Bull.

Scheduled for general availability in August, Version 2 of ISM runs on the IBM RISC System/6000 systems that Bull resells as its DPX/20 line. This is a change from the first release, introduced a year ago, which supported 486-based desktop machines running The Santa Cruz Operation's SCO Unix.

Other Unix hosts are being qualified, Bull indicated, although it did not identify any specific platforms.

Version 2 also adds capabilities for monitoring Bull's mainframes running under the GCOS 8 operating system, as well as new monitoring and management support for internetworking devices and expanded tools for writing heterogeneous management applications.

The ability to monitor a variety of outside systems, including IBM and Unisys Corp. mainframes and HP and Digital Equipment Corp. hardware, is planned for future releases, Gervais said.

He added that Version 2 should be more dependable than ISM V1, which "was really a beta-test version" and has only been installed at a small number of user sites. Pricing for ISM Version 2 starts at $24,975, and Bull said it expects the software to compete with IBM's NetView family and OpenView.

Stephen Josselyn, an analyst at International Data Corp., a market research firm in Framingham, Mass., did not discount Bull's chances of getting outside business for its integration software.

"They've got some decent expertise there and a pretty good model" with DCM, he said. "It would obviously be in the running because it would save other people the time of having to go out there and develop it themselves."

However, Josselyn still is not convinced that integrating entire enterprises is feasible because of political issues at the user level. "All departments have to work together, and I'm not sure most organizations are capable of putting those things together," he noted. "Those barriers are much bigger than the technological barriers."

IF YOU'RE
IMPRESSED WITH
PROJECT MANAGEMENT
SOFTWARE THAT ONLY
DOES SCHEDULING
AND TRACKING,
YOU HAVE A LITTLE
CATCHING UP TO DO.

YOUR TICKET OUT
OF THE DARK AGES.

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS MAIL PERMIT NO. 388 HURST TX

POSTAGE WILL BE PAID BY ADDRESSEE

TELESALES DIVISION
APPLIED BUSINESS TECHNOLOGY CORPORATION
227 NE LOOP 820 STE 3A
HURST TX 76053-9898

[redacted]

Software application packages

Dynamic Information Systems Corp. has unveiled Omnidex, an indexing system designed to give instant access to Digital Equipment Corp.'s Record Management Services (RMS) through Microsoft Corp.'s Windows-based applications.

According to the company, Omnidex provides fast and flexible access to data, offering retrieval performance improved by as much as 1,000% over standard keyed RMS access. The product can be added to existing data structures and databases, and it can maintain on-line indexes.

For client/server applications, Omnidex can be implemented via Windows applications using Visual Basic to create the retrieval screens.

Prices range from $9,000 to $56,500.

▶ *Dynamic Information Systems*
5733 Central Ave.
Boulder, Colo. 80301
(303) 444-4000

System Software Associates, Inc. has announced that it will offer Microsoft Corp. Windows NT versions of three of its client/server applications that are now available for users running IBM's OS/2.

Planner's Assistant, Financial Analyst's Assistant and Formulation Assistant are client/server business applications that provide 32-bit cooperative processing between an IBM Application System/400 server and a workstation.

Each of the three client/server applications costs $7,500 per workstation.

▶ *System Software Associates*
500 West Madison St.
Chicago, Ill. 60661
(312) 641-2900

CES Business Systems has introduced the Aurora Phoenix, a line of management and accounting systems.

The Aurora Phoenix Financial System features include accounts payable, accounts receivable, general ledger and financial reporting and budgets. The Aurora Phoenix Property Management System comprises a series of modules that can be selectively implemented.

The Aurora Phoenix Construction System has modules that include subcontract payable, purchase order, home costing, work order/service billing and payroll, among others.

The fourth-generation language Aurora Phoenix application product line includes flexible, user-defined reporting, full-color graphics reporting, quick programming, smart windows and fully integrated financials and management information.

Prices start at $5,000.

▶ *CES Business Systems*
15037 Yonge St.
Aurora, Ontario L4G 1M3
(416) 350-3989

Utilities

Serena International has released Pdstools Version 3.1.1., a programmer's workbench that provides users with a complete environment created to manage partitioned data sets, extended partitioned data sets, VSAM and other files. Full-screen edit and browse facilities are included with Pdstools' ability to support VSAM for all data set types.

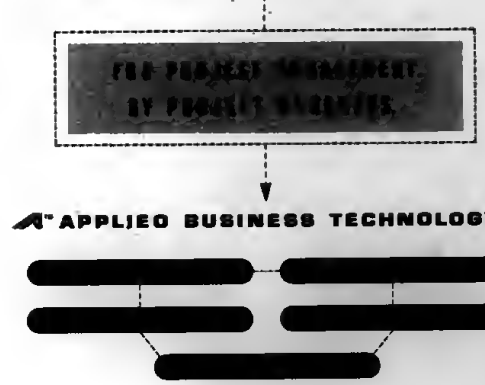
The product offers VSAM utilities that search and replace character strings, back up allocated VSAM data sets, provide on-line diagnosis of problems that could affect VSAM availability and detect logical errors.

Pdstools Version 3.1.1. prices range from $5,000 to $25,000.

▶ *Serena International*
2nd floor
500 Airport Blvd.
Burlingame, Calif. 94010
(415) 696-1800

ABT's completely integrated system has just turned some popular project management software into relics of the past. That's because the scope of Project Management in the IS environment is expanding to include estimating, CASE Integration, methods, metrics and Total Quality Management, and it appears that only ABT's system has emerged from the dark ages. And with Rapid Implementation, we can have this system up and running for you in six short weeks. Give us a call at 1-800-4-PROJEC and find out more.

We think you'll find that it's worth a grunt or two.



Products are available in DOS and Windows Operating Environments.

DO YOU SELL OUTSOURCING?

Advertise in Computerworld's Time and Services Classifieds. They work.

800-343-6474
x744

WHY THE WORLD'S BIGGEST DATABASE COMPANY WANTS CONTROL OF YOUR BUSINESS.

WHY THE WORLD'S NUMBER 2 DATABASE COMPANY WANTS YOU TO KEEP IT.

You can turn your database into a formidable strategic asset. What you need are open systems, open software, and a database vendor who lets you design your database around your business. Instead of around their products.

That's why you should talk to Ingres. All INGRES® database software runs on all open platforms. And we won't ever try to force-fit your business into our line of products.

Instead, Ingres offers a superior core of open database software, tools, and connectivity products. Products we've designed to work with applications from more than 1,000 other vendors.

The result? You have more options. You have control of your computing costs. And *you* have control of your business.

Would you like to control your own fate? We'll send you a detailed white paper from the Aberdeen Group, an independent industry analyst. It tells you what to look for when you evaluate open database software.

Just call 1-800-4-INGRES.

Ingres

THE ASK GROUP

Based on publicly reported revenue as of 12/31/92.

©1993 Ingres Corporation. INGRES is a trademark of Ingres Corporation. GA-1273

Hewlett-Packard's open computer systems reach across 72 countries to help ITT Sheraton pamper their guests. While keeping the lid on costs.

"Beyond providing state-of-the-art hardware platforms, HP assumed a partnership role in helping us achieve our strategic business goals."

— Lawrence W. Hall, Director, Hotel Systems
ITT Sheraton Corporation

ITT Sheraton's highest priority is to provide the most personal and efficient hospitality service in the world. That means helping all 450 of their hotels use and share information better. Including detailed advance knowledge about each guest who has stayed anywhere in the ITT Sheraton chain.

Hewlett-Packard helped ITT Sheraton fulfill their vision of a single integrated property system. A system that combines ECI's property management software and ITT Sheraton's reservation system with what have proved to be the perfect hosts—HP 9000 UNIX® Business Servers. With low cost of ownership, scalable range of systems and global support, HP has delivered a world of value.

To check us out, call 1-800-637-7740, Ext. 7447 for a case study. It proves you can shell out less than you think for a gem of a system.

Think again.

HEWLETT PACKARD

UNIX is a registered trademark of UNIX System Laboratories Inc. in the U.S. and other countries. GSY5309 ©1993 Hewlett-Packard Company

Stephen M. Kuhn

Development doldrums

Throughout the business world, the issue of the day is productivity. While many users are reaping big productivity gains from this decade's pheoomenal growth in computer power, applicatioo developers, strangely eoough, have been left in the lurch.

Best estimates are that software development productivity is improving at a rate of 4% to 7% annually. But that's nothing compared with recent hardware performance gains.

By most accounts, hardware performance is doubling in speed and being halved in price every two years. That alone accounts for a large proportion of the increase in software productivity.

Frankly, the software developmeot tools market is caught in a rut. The tools available today are essentially oo different than those of 20 years ago. We are still developing code using a basically unimproved edit-compile-link-debug approach. If chip manufacturers were improving chips at the same rate as software developers are progressing, we would still be working with a 6-MHz 286.

Too complex

The culprit is complexity. Creating software is perhaps the most complex cognitive process in the world. Using current tools, programmers must be able to remember the what, how and why of every micro-detail in a project. This needlessly takes up a large portioo of developers' mental eoergy and distracts them from their primary task: creating software.

It gets worse. The more sophisticated an application, the more complex the development

Kuhn, *page 97*

Client/server tools

Visual Basic stirs competition

By Melinda-Carol Ballou

■ An aggressively priced Visual Basic 3.0 is causing client/server tools vendors to reconsider their pricing, in some cases offering discounts, in an effort to protect their market share.

Given that Microsoft Corp.'s Visual Basic costs about 80% less than competing products, it could force a market shakeout, analysts said last week — but only if the firm can meet promises for improving the product, such as allowing users to perform broader, collaborative programming.

Already, client/server applications tools vendors such as Powersoft Corp., Gupta Corp. and KnowledgeWare, Inc. are waging a price battle as they seek to gain mindshare and compete with the low-balled pricing of Visual Basic.

While Microsoft's recently shipped Visual Basic Professional 3.0 carries a promotional price of $395 — which will increase to $495 — the other tools range in price from around $2,000 to $3,900.

KnowledgeWare led the others with a three-month discount from April to June 30 (see chart). Gupta brought its pricing down to a single-copy price of $199 until July 31. And Powersoft eliminated its runtime licensing fees — a per-server charge of $999. (Gupta is retaining its fees of $250 per clieot or $1,595 per database machine with unlimited clients.)

Powersoft will not offer comparable discount programs because it has not found them to be successful in the past, officials said.

Tool time

Pricing wars have created hefty discounts for programming tools

Powersoft	PowerBuilder	$3,895	$3,595*
Gupta	SQLWindows	$1,995	$999
KnowledgeWare	ObjectView	$2,799	$999
Microsoft	Visual Basic	$495	$395

* Ongoing price change for OS/2 version

CW Chart: Janell Genovese

But analysts said the tools vendors would be ill-advised to ignore the pricing impact of Visual Basic and other lower cost tools.

"The companies are experiencing pressure from development tools like Visual Basic, which are cutting substantially into their market share," said Rich Finkelstein, president of Performance Computing, Inc., a Chicago consulting firm. "It's hard to justify the high cost of a PowerBuilder or SQL Windows. The costs are artificial — the products just aren't that much better" than Visual Basic.

Other analysts said Visual Basic does not yet have the functionality of the other tools, though they agreed that the pricing issue may force players to cut back.

"If you are a deep-pocket player, like Microsoft, then you can cut the oxygen off to the competition by starving them in terms of short-term sales so they can't afford to develop and go out and sell," said Aaron Zornes, analyst at Meta Group, Inc., a market research firm in Stamford, Conn.

"I see a winnowing out of products over time to around half a dozen that really work well with client/server applications," Finkelstein said.

Powersoft and Gupta users, on the other hand, spoke enthusiastically about the products and pricing changes.

"Gupta offered a pretty good discount, so we expedited" the move to Version 4.0 of SQL Windows, said Larry Will, software engineer at Vitro Corp., an engineering firm in Silver Spring, Md. "We don't consider Visual Basic to be in the same class as Gupta — [Gupta] makes it easier to develop complex applications because it abstracts everything and it's extensible."

"To us, the difference in price [between PowerBuilder and Visual Basic] could be made up in a week's worth of development time," said Stephenn Kaltenhauser, manager of IS at Unigas Corp. in Calgary, Alberta.

For Windows World Open, Computerworld's custom applications contest, about two-thirds of the 144 applicants used Visual Basic in conjunction with other tools. Two of the three contestants who used only one tool used Visual Basic for their projects, which were smaller scale. Developers of larger applications generally use multiple development tools.

Bell Atlantic leads in manual design

By Mitch Betts
BELTSVILLE, MD.

Bell Atlantic Network Services, Inc., always trying to improve the quality of the internal information systems it builds, has writteo what is essentially an ultrapractical construction manual for use by its system builders.

The 10-part manual blends Bell Atlantic's development methodology with DesignPro, a collection of "best practices" for applications software engineering.

DesignPro, a guidebook produced by Arlington, Va.-based American Management Systems, Inc. (AMS), is part of AMS' Applicatioo Design Quality consulting service.

For Bell Atlantic, the six-month process of blending the two documents into one manual was challenging, educatioool and important, said Joyce Bailey, manager of the software engineering process group. To avoid overwhelming the staff with too many binders and methodologies, Bailey was adamant about creating a single, integrated volume of documentation.

"The marketplace just had bits and pieces. I wanted to put them all together and make a cohesive, coherent set of documentation that our practitioners can use conveniently," she said.

Bailey said she threw out the "high-level, conceptual" parts of DesignPro and transformed it into a practical, how-to manual tailored to Bell Atlantic's environment. The manual is broken down into 10 booklets on various software development topics, such as requirements, design, testing and documentation.

A key goal of the manual is to get Bell Atlantic's system developers to consider the elements of quality software at the outset, Bailey said, and then reinforce those quality

Bell Atlantic, *page 96*

Building quality

The Software Engineering Institute's software process maturity model can be used to categorize the quality of a software development and maintenance operation

5	Optimizing	Improvements fed back into the process.
4	Managed	Process is measured, quantified.
3	Defined	Process is institutionalized, stabilized.
2	Repeatable	Methodology is repeatable.
1	Initial	Process is ad hoc, chaotic.

Source: American Management Systems, Inc., Arlington, Va.

CW Chart: Michael Siggins

61 Reasons Why is the "Best Com

Computerworld puter Newspaper"

Awards competition was held
of the competition
Press Association.

More EDA/SQL gateways offered

By Melinda-Carol Ballou
BOSTON

Information Builders, Inc. is now shipping 13 EDA/SQL gateways to databases running on IBM mainframes, including VSAM, IMS, Oracle, Teradata, Supra and Adabas, company officials said. The introductioa is scheduled for Client/Server World this week.

The gateways offer improved performance and access to mainframe data from third-generation language (3GL) and other applications, the officials added.

The EDA/SQL gateways can be accessed using front-end tools that support EDA/SQL, such as Lotus Development Corp.'s 1-2-3, Microsoft Corp.'s Access and Information Builders' own tools.

The gateways can also be accessed via an application programming interface to 3GL applications handling proprietary dialects and extensions to SQL, officials said.

In addition to supporting the appropriate EDA/SQL Data Drivers to read tables and support catalogs, the gateways also allow users to issue Remote Procedure Calls to incorporate customized 3GL procedures that read and update the databases.

The gateways will offer access to mainframe tables from 17 remote client environments, including DOS, Windows and OS/2, as well as Macintosh, Unix, MVS, VAX/VMS and MPE/IX.

Users with transaction-intensive applications have found the performance costs of EDA/SQL drivers prohibitive, according to Rich Finkelstein, president of Performance Computing, Inc., a consultancy in Chicago.

On the other hand, he said "TP lite" decision support applications have benefited from the products.

One such user is KFC Corp. in Louisville, Ky. Micki Thomas, applications development specialist at KFC, said the ability to give field employees access to mainframe data has been of enormous benefit to the company.

"They used to have to [review] the data from reports — now they can spend their time actually analyzing the data rather than re-keying it," Thomas said.

Bell Atlantic

CONTINUED FROM PAGE 93

principles throughout the development process. Otherwise, issues such as performance and security may become expensive afterthoughts.

"DesignPro is full of common sense, but very often those [issues] are the very things that are forgotten and bite you in the end," Bailey said.

Creating the manual is a small part of Bell Atlantic's effort to have "repeatable software processes" and move up the ladder of the Software Engineering Institute's software process maturity model. Bailey said that in the far-flung Bell Atlantic empire, some development units may rank at Level 2 or 3, while others are down at Level 1 (see chart page 93).

Bell Atlantic also wants to get to the point at which it can reuse software designs for generic business applications, such as on-line transactions and electronic data interchange. Then, the generic designs can be adapted to specific conditions, Bailey said.

DesignPro was designed to promote reusability and flexibility in applications software, according to Laurence J. Best, a principal at AMS and an expert on application software design.

For example, a dispatching system and a system for debt collection may look very different, but at their core they are work-flow applications that require the assignment of tasks to people, Best said.

DesignPro provides a standard template for building generic work-flow applications so designers do not have to do that part from scratch, he said.

Likewise, DesignPro describes the basic issues involved in building data interchange, inquiry, search and table-manipulation applications, as well as graphical user interfaces.

Shocked by the do-it-yourself client

Yes, I'd like to receive a copy of Answers to Getting Started with Client/Server.

CW61493

We are considering the implementation of client/server computing in: ☐ 0-6 mos, ☐ 6-12 mos, ☐ 12 mos +, ☐ Unsure

NAME_____

TITLE_____

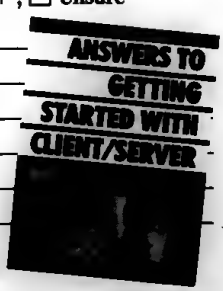
COMPANY_____

ADDRESS_____

CITY, STATE, ZIP_____

TELEPHONE_____

Or for faster service call 1-800-457-6993



NO POSTAGE
NECESSARY
IF MAILED IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 434 NAPERVILLE, IL

POSTAGE WILL BE PAID BY ADDRESSEE

NETG™

Attn Marketing Services
National Education Training Group
1751 W Diehl Road
Naperville IL 60563-9881

Kuhn

CONTINUED FROM PAGE 93

cycle. Multideveloper projects, the demands of the consumer market and the enormous increases in hardware performance have pressured programmers to create increasingly sophisticated products.

Too bad, then, that software development tools continue to be the greatest hindrance to building better quality products, rapid advancement of software technologies and shorter product cycles.

Some development tools focus on minimizing the edit-compile-link cycle. That's not enough because developers still spend the majority of their time editing and debugging. While those tools have evolved somewhat during the last two decades, they have not had a big effect on productivity.

What we need is a suite of tools that understand the process of software development. This is not just a big database with a browser on the front of it. That approach is just too passive, as you get only the information you ask for. If you always knew what to ask for, you would probably know what to do, and you wouldn't create buggy software, right?

What's really needed on the front end of this database is an adviser. Such a tool would understand what you are trying to do when you write software. The adviser would answer the questions you frequently ask: "Where is this variable declared?" "What method in this program takes two ints and returns a pointer to a gizmo structure?" "How many references are there to this function, and what is the effect of changing it?" Such questions are not easily answered with the existing tools.

The adviser would have three primary functions. First, it would tell you that you have created a potential bug as soon as you create it. This would ease the burden of complexity. Second, it would automate routine editing chores by reducing the mechanical grunt work a developer often performs, such as automatically declaring variables and functions.

Finally, it would act as a to-do manager, letting you know when a module needs editing or updating. This also reduces time wasted on unnecessary compiling, linking and debugging.

Real enhancements

Although these enhancements sound like the dreaded artificial intelligence, they really are made possible through the classic rules-based systems used in most of today's compilers. Adding these functions to software development tools would enhance productivity while allowing developers to use the same programming paradigms they use today.

Nor is this science fiction. In fact, a few companies have already begun to include such intelligence in their development tools.

Knowledge Systems in Cary, N.C., is promising 1993 delivery of a Smalltalk programming environment with some of these facilities. Component Software in Lexington, Mass., has added these and other enhancements to its C++ software development tool for the Apple Macintosh — and soon for Microsoft's Windows. Parametric Software in Waltham, Mass., is working on another C programming environment for delivery on Unix workstations.

All promise to address the needs of IS shops and Cobol programmers.

Kuhn is managing partner of Union Consulting, a Boston-based technology, business and marketing consultancy.

shortcomings of /server training?

If you're like most people who've started on a program of in-house client/server training you may be disappointed with the results. If you haven't started, it's because you've recognized the need for professional training.

Also you have probably recognized that great truth... technology enhancements without people enhancements are of little value.

DANGER, CHEAP SOLUTIONS

Many organizations are currently getting their client/server education by combining free seminars, computer publication editorials and biased vendor information... which hardly represents a seamless flow of knowledge or professional skills training.

NETG, A BETTER WAY

NETG's mission is to provide IT professionals with the unbiased knowledge and skills required to keep up with today's accelerating pace of change.

And to help these professionals make productive use of their IT investments NETG is delivering decision-assisting knowledge and computer re-skilling, both critical components of business re-engineering.

Who is NETG? NETG is the world's leading resource for training and education in the areas of advanced technologies, information processing, management skills development, and end-user software training.

TRAINING ON DEMAND...

The power of NETG lies in their incredible flexibility at adapting to specific customer requirements, whether IT or end-user oriented. With NETG you can choose: training on demand... through Compact Disc (CD-ROM), CBT (Computer Based Training), Interactive Video and Video Cassette Instruction... or classroom training designed to fit specific needs on state-of-the-industry topics. More than 10,000 professionals annually benefit from NETG's programs.

...OR WITH DR. JAMES MARTIN

Management education, through NETG's James Martin Insight video courses, is also available to provide IT management with a current, objective perspective of the changing IT world.

SEND FOR "ANSWERS"

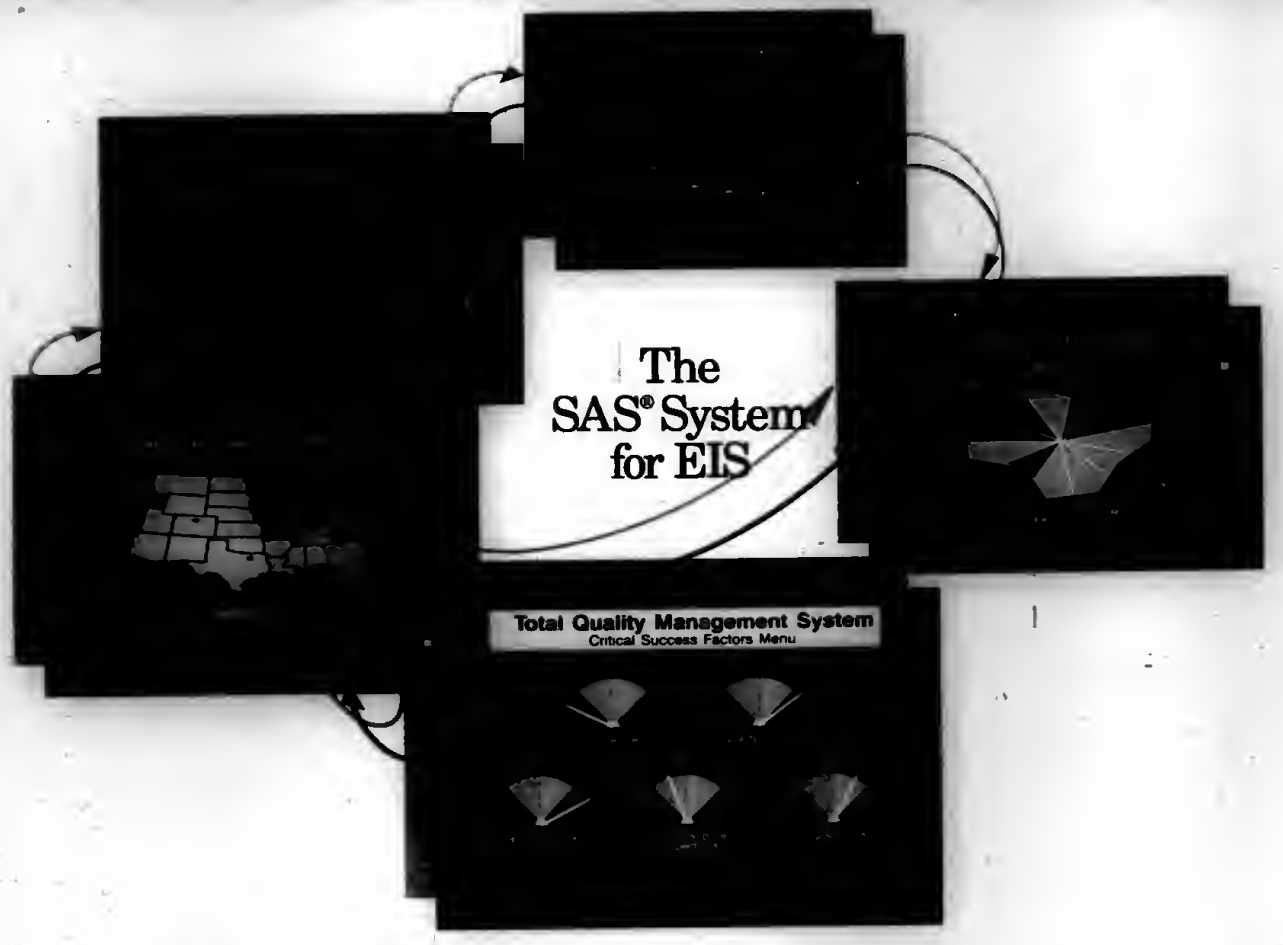
If you're harboring fears of the unknown, ask for our brochure ANSWERS TO GETTING STARTED WITH CLIENT/SERVER. Call 1-800-457-6993, or write National Education Training Group, Inc., Attn: Marketing Group, 1751 West Diehl Road, Naperville, IL 60563-9099.

Call 1-800-457-6993

NETG™
RE-SKILLING...FOR RE-ENGINEERING!

Call today for your FREE guide to getting started with client/server computing.

HOW TO SELL USED EQUIPMENT.
Advertise in Computerworld's Classifieds. They work.
800-343-6474
x744



The Difference Between Face Value and Real Value

It takes more than a fancy front end to make a full-function Executive Information System. To be of *real* value, an EIS must deliver the right information to the right people at the right time...to support strategic decision making. That's why you need the SAS System.

Software that's Changing the Face of Information Delivery

Of course the SAS System gives executives such EIS "basics" as up-front menus...pull-down windows...drill-down, traffic-lighting, hot-spotting, and exception reporting... graphical display of critical success factors...and desktop productivity tools such as calendars, notepads, a letter-writing facility, and access to native electronic mail.

But the benefits of the SAS System extend far below the surface. As the world's leading information delivery system, the SAS System provides *total* control over data access, management, analysis, and presentation. Executives can directly access all kinds of data sources—including data locked away in database management systems. And they can analyze and present data using specialized tools for project management, forecasting and financial reporting, and hundreds of other tasks... all fully integrated.

Information managers can build a custom-tailored EIS... in far less time, and using fewer resources, than it takes to force-fit an off-the-shelf solution into *your* organization. And because the SAS System is entirely portable, you can integrate data and applications from different computing environments into a single, company-wide information delivery system.

Free Video Preview...Call Today.

There's more to the SAS System for EIS than meets the eye. Call us now at 919-677-8200 to arrange for your free video preview...plus details about a no-risk software evaluation and upcoming SAS System executive briefings.

SAS®

SAS Institute Inc.
Software Sales Department
SAS Campus Drive ☐ Cary, NC 27513
Phone 919-677-8200 ☐ Fax 919-677-8123

Printed in the USA.

SAS is a registered trademark of SAS Institute Inc. Copyright© 1991 by SAS Institute Inc.

JEAN GENIES

Four years ago, VF Corp. faced shrinking revenue and profits. Today, the multibillion-dollar maker of Lee and Wrangler jeans has its pockets filled with cash, thanks to new business processes and technology.

When the supply of Lee jeans gets low at a JC Penney Co. store, new pants will arrive within days to replenish the shelves, without a JC Penney buyer so much as touching a telephone to place an order.

Magic? Not exactly. Instead, it's an automatic inventory management system developed and managed by VF Corp., an apparel giant that makes the Lee brand of jeans along with more than a dozen other clothing lines, from Vanity Fair intimate apparel for women to Healthtex clothing for children.

While the inventory system makes life easier for JC Penney, it is even more meaningful to VF. The system is a central piece of a re-engineering strategy the company is now executing to stay competitive in the 1990s, according to Lawrence Pugh, chairman and chief executive officer.

Pugh says the strategy — which was officially launched in 1989, before he says VF had even heard the term "re-engineering" — was really a no-choice decision for the company, which was founded 90 years earlier as a maker of silk gloves.

As the 1980s came to a close, the company's revenue had leveled off in the $2.5 billion range. When Pugh looked to see what was wrong, he zeroed in on his Lee division, which VF had acquired in 1970, and he didn't like what he saw.

The jeans business was dabbling in fashion trends and not keeping up with the competition or delivering what its customers wanted, he says.

Pugh now says Lee was the primary cause for near-stagnant revenue.

"They had gotten big, sloppy and arrogant, and they weren't listening to the consumer," Pugh says of the jeans division. "At that time, I woke up and, looking out into the '90s, I recognized we had to do business differently than in the '80s."

Behind the times

When Pugh woke up, he realized that the problems with Lee were signaling a bigger issue, even though the other businesses showed no signs of trouble. Lee had lost track of what consumers wanted, in part because it didn't have effective tools to collect data on sales and buying trends. Furthermore, when it responded to changes, it was hung up by the traditional long production cycles the apparel industry had relied on for decades.

Pugh says VF needed to fundamentally change its business processes and devise a more aggressive information systems strategy to become a more responsive and competitive company.

"We've had to switch from just maintaining programs to finding ways to develop competitive advantage," adds H. Lynn Hazlett, vice president of business systems. Hazlett, who did a stint at rival Levi Strauss & Co. and then worked in retail IS, was recruited by Pugh as part of the turnaround strategy.

Led by the CEO but crafted from the input of hundreds of VF employees, the company established a corporate strategy in 1989 to redefine the core processes. It calls the mission the Market Response System (MRS), and it includes three new business processes, such as the inventory management system JC Penney now uses. The other two are continuous merchandising, with a goal of more frequent shipments to retailers, and flexible manufacturing, which would

Jean genies, *page 102*

Eugene Mopsik

▶VF's H. Lynn Hazlett: *Switching from maintenance to competitiveness*

Intelligence Files

RAD management

Does rapid application development (RAD), which compresses the systems development cycle, lessen the need for project management skills?

Not at all. RAD does shift some of the work to the end-user community, but the compressed time frame actually requires a greater emphasis on effective time and budget management.

Therefore, RAD and project management tools should be integrated so organizations can reap the benefits of RAD. Information systems departments should build a RAD/project management software tool kit — much like an expert system — and provide end users with it so they can drive the RAD process.

Source: Lecture by Guisseppi A. Forgionne of the University of Maryland-Baltimore County, given at the Baltimore Association for Systems Management Systems Conference, May 27, 1993.

Users as vendors

Some aggressive information systems departments have started selling internally developed software to outsiders. A survey of 51 IS directors found that a majority are dabbling in software sales to boost corporate profits.

However, many IS units are not well-organized for external sales, and there is some concern that the activity could divert the IS unit from its core functions.

The biggest challenges are providing adequate documentation and ongoing maintenance for the product, as well as creating a sales unit with an entrepreneurial attitude.

Source: "An exploratory study of software sales and purchases between IS departments" by Fritz H. Grupe, *Journal of Systems Management*, April 1993.

In-house patents

Finance and insurance firms continue to get patents for computer systems that underlie new financial products. The latest example is Signature Financial Group, Inc. in New York, which recently won a patent for the Hub and Spoke system of mutual funds management.

The complicated Hub and Spoke structure allows assets from diverse classes of investors (or spokes) to be pooled into a single investment fund (the hub) for more efficient management.

There is some debate about whether this structure is truly revolutionary, and it will likely be challenged in court.

Source: "Mutual fund patent granted" by Christine Philip, *Pensions & Investments* [trade newspaper], April 19, 1993.

Creative programming

There are two schools of thought about software development: Either it is a task full of routine procedures that could be easily automated, or it is one of the most complex and creative activities undertaken by humans.

A careful study of development tasks shows the latter is closer to the truth. The study discovered that human ingenuity outweighs routine action by a 4-to-1 margin during software development.

The research gives programmers some ammunition against notions that they can be automated out of existence or managed by nontechnicians. It also may explain why developers spend so much time staring into space.

Source: Pennsylvania State University news release, May 7, 1993.

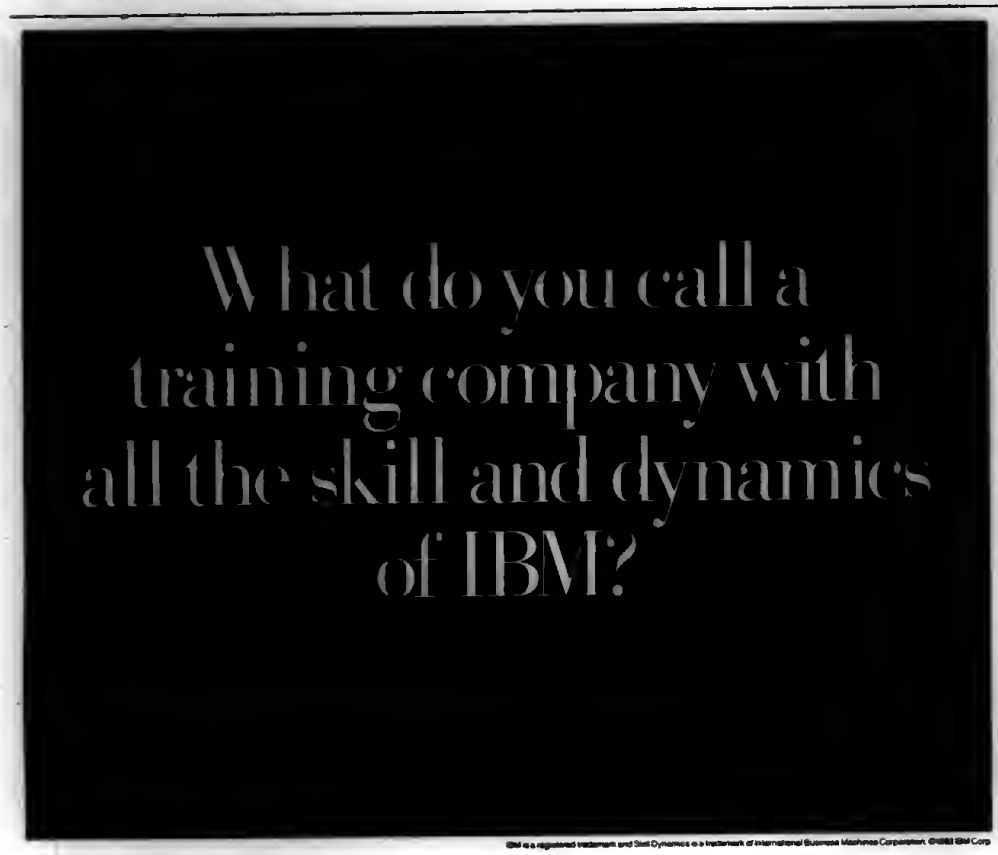
Change blockers

Five major blocks can scuttle efforts to manage innovation and technological and cultural change, according to James Cash, chairman of the MBA program at the Harvard Business School.

Literacy blocks: Managers don't know how technology can be used to solve problems. *Culture blocks:* Some organizations insist that technology projects have clear efficiency payoffs and discourage executives from becoming associated with technology initiatives. *Vocabulary blocks:* Ideas are expressed in terms of technology, not business. *Value blocks:* Uncertainty about what should be used to measure a project's value. *Implementation blocks:* Lack of a champion who can take the idea up the organizational chart.

Solutions are complex, but Cash said designing new administrative systems can eliminate many of the blocks.

Source: "An interview with James Cash" by Neal Goldsmith, *Business Technology*, May 1993.



IBM is a registered trademark and Skill Dynamics is a trademark of International Business Machines Corporation. ©1993 IBM Corp

Imagine one company made up entirely of technology, management and consulting specialists hand-picked from inside IBM.

A full-service training company that knows first-hand the importance of maximizing the potential of people *and* technology.

Now stop imagining.

And start maximizing.

Because Skill Dynamics is up and running with what could be the industry's widest range of education and training services.

From instructor-led and computer-based training to customized courses—offered at our sites, or yours.

From management and professional skills to quality processes, industrial training and maintenance service skills. From full-blown multimedia classes to enterprise systems and PC classes.

Plus a long list of continuing professional education to help you keep your edge—after we've helped you attain it.

Our skills range from education consulting to developing curricula to actually training trainers—all at very competitive prices.

We're Skill Dynamics.

The first training company to come right out of the blue, to help keep you in the black.

For a catalog or advice from a curriculum expert, call: 1 800 IBM-TEACh, ext. 222.

Skill Dynamics™
An IBM Company

IS THIS HOW YOUR MAINFRAME CONTRIBUTES TO DOWNCOSTING?

A computer system should save you money from the moment you buy it. It should dramatically reduce overhead. It should drive your corporate downcosting. The Encore Infinity 90™ is this system. It's priced as much as 80% lower than conventional mainframes it routinely outperforms. Its open architecture lets you choose from an array of compatible, standard software—thousands of applications and a wealth of data base software, languages and development tools that permanently reduce programming and training costs. When it's time for growth, you easily and inexpensively add to the Infinity 90's processor, storage and I/O bandwidth base. And its inherent fault resilience means the most cost-effective continuous operation. Built for peak productivity and minimum outlay, the Infinity 90 delivers economic health to your entire enterprise.

Think beyond downsizing. Think downcosting. Think Infinity 90.

ENCORE

COMPUTER CORPORATION

DELIVERING ENTERPRISE SOLUTIONS

Encore Computer Corporation
6901 W. Sunrise Blvd.
Ft. Lauderdale, Florida 33313-4499
(800) 933-6267 U.S. and Canada
(305) 587-2900 Worldwide

™Infinity 90 is a trademark of Encore Computer Corporation.

Jean genies

CONTINUED FROM PAGE 99

enable VF to produce smaller but quicker production runs.

As it inched ahead into 1990, VF took its biggest hit: a huge drop in profits, from $176 million to $81 million in 1990. But today, MRS is showing results: VF can ship orders within five to seven days, down from an 80-day cycle.

The inventory management system — officially called flow replenishment — feeds point-of-sale data to VF, which can highlight a switch in buying patterns.

The company can now shift gears quickly and produce more or less of a given style.

The result? In 1992, the company reported $3.8 billion in sales, a 30% increase over 1991, and net income of $237 million, a 47% jump from the previous year.

Today, VF continues to shed its traditional approach to the apparel business, which relied on long production cycles and often crafted product strategies with little consumer input.

CEO Lawrence Pugh says more than 200 managers at Lee kicked in suggestions for the re-engineering effort.

A typical product cycle, from the birth of an idea to arrival on a store's shelves, could take 18 months to upward of two years. New designs can now be produced within several weeks.

Efficiency rules

The flexible manufacturing component is replacing the long cycles of high-volume production runs with new job scheduling and factory management that produces smaller, more frequent orders.

Meanwhile, continuous merchandising is ending the tradition of a small number of large shipments to retailers each year to more frequent but smaller deliveries. Flow replenishment transforms the retailer/supplier relationship into a partnership and helps both parties better manage inventories.

The three pieces are interdependent. Flow replenishment data makes continuous merchandising possible, and VF cannot easily perform continuous merchandising without a flexible manufacturing approach.

MRS is backed by an IS infrastructure dominated by IBM equipment. Host-based processing remains essential at VF, as it is crunching so much data and using it across systems. The company runs IBM mainframes and is a user of IBM's DB2 and Information Warehouse. Smaller divisions run Application System/400s and the front-end platform is OS/2.

VF can't be credited with total originality for its MRS strategy. Many well-known retailers have also been implementing some form of quick response strategy. But it does win points from industry analysts for its implementation skills.

"They are viewed as fairly progressive — not the leading edge but the cusp," says Claire Parker, a vice president and consultant at Cleveland Consulting Associates, a division of Computer Sciences Corp. "They see what works, and then they are quick at getting out a response."

Alan Millstein, publisher of the "Fashion Network Report" in New York, adds, "They have been proponents of quick response, and they're heavily invested in technology. But most of their major customers demanded it, too."

And MRS implementation has not been easy. It requires multiple changes to take place at once, but executives say that because VF staffers had a voice in what those changes would be, they are more willing to make the necessary changes.

So, as factory workers adjusted to dramatically new schedules and sizes of production runs, VF representatives were on the streets promoting flow replenishment to potential retail partners.

"We didn't tell people, 'Here are the changes,'" says Mackey McDonald, a VF group vice president in charge of the jeans business. He replaced the executive who managed Lee in the 1980s.

"Over 200 managers in the jeans business were involved. We asked what can we do in development, merchandising, trucking... and each of those groups came back with suggestions."

Pugh insists he is the "catalyst" for the re-engineering effort, and he personally sees to it that each of his divisions is following through on MRS.

"There aren't many conversations that I have with people today where this isn't part of the conversation," Pugh says.

Progress reports

Each division is responsible for providing Pugh with quarterly updates on its progress. Yet he is quick to point out that each group is also on its own schedule, and each is measured individually on progress.

"We did not put together a blueprint and hand it to them," he says. "We gave them the objectives."

Today, every business unit has implemented each of the three initiatives, and the progress varies by division, Pugh says. No division is operating from start to finish on the new plan yet.

Pugh says he's confident the company will keep coming back from the 1980s because VF understands its customers better than before.

"The consumer of the '90s isn't going to have the money they had in the '80s," Pugh says. "We can't pass price increases the way we did in the '80s. In order for us to reduce our costs, we had to fundamentally change the ways we manufacture our products." ■

VF CORP.

Headquarters: Wyomissing, Pa.

Founded: 1899

1992 revenue: $3.8 billion

Major brands: Lee and Wrangler jeans, Vanity Fair intimate apparel, Jantzen casual wear, Healthtex children's wear

CEO: Lawrence Pugh

CIO: H. Lynn Hazlett

Number of employees: 57,000

Corporate strategy: Market Response System

1. Flow replenishment: Automatically maintains retailers' inventory based on previously agreed-upon amounts. In some cases, will also automatically restock for retailer.

2. Continuous merchandising: Point-of-sale data used to determine trends. Enables VF to respond to consumer demands within the same selling season.

3. Flexible manufacturing: Production based on smaller but more frequent jobs. Also allows VF to respond to market changes more frequently and reduce quality-control problems.

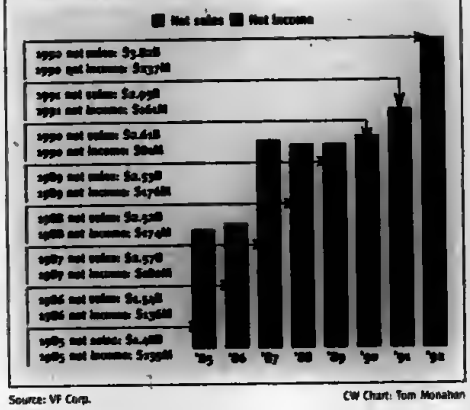
■ Information systems architecture

VF runs IBM ES/9000s at its data center hub in Greensboro, N.C. IBM DB2 and Information Warehouse are the centralized data management systems that support corporatewide use of the Market Response System. Corporatewide IBM SNA network links the corporation.

VF connects to retailers via electronic data interchange mechanisms and uses bar coding and point-of-sale computers to support its flow replenishment initiative.

FASHIONING A COMEBACK

VF's business re-engineering jump-started revenue by more than $1 billion over three years



Source: VF Corp. CW Chart: Tom Monahan

Go with the flow

While VF's corporate strategy is made up of three initiatives, the flow replenishment component stands out as its most significant overhaul and could have the biggest long-term impact.

Flow replenishment has turned VF's relationships with retailers into partnerships and has become a competitive tool for VF.

"The companies who are utilizing IS innovatively are the ones moving down this path of managing inventory for retailers," said Claire Parker, a partner at Cleveland Consulting Associates, a division of Computer Sciences Corp.

Flow replenishment is based on electronic data interchange — the linking of buyer and supplier — and is an extension of quick-response concepts used by retailers for years.

With flow replenishment, customers can place orders electronically with VF and manage their inventories with VF.

The key is to tap into point-of-sale (POS) data and analyze it continuously to track movement of product and see what is selling and what isn't.

"When we didn't have it, we could let small changes at the retail level build up," said Mackey McDonald, a VF group vice president. "Now, we see the changes occur on a smaller basis and we can adjust."

More recently, a few customers, including JC Penney, have allowed VF to manage the flow of stock. VF watches the retailer's POS data and automatically updates a particular item once the quantity falls to an agreed-upon point.

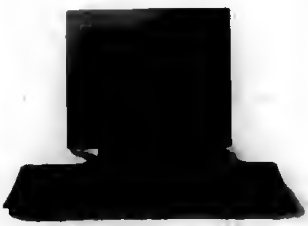
Dave Evans, vice president of IS at JC Penney, which works with about 4,000 suppliers, is currently connected electronically to about 2,700 of the suppliers. Of that group, only two — VF and Hallmark Cards, Inc. — have managed the retailer's inventory.

JC Penney prefers to manage its own inventory models, but VF "was anxious, and we said, 'Let's give it a try,' and we are very happy," Evans says.

H. Lynn Hazlett, vice president of business systems, says the firm is working with 300 retailers on the basic flow replenishment, and it has changed potentially antagonistic relationships into team-oriented relationships.

The complex steps you must follow to add Wyse terminals to your DEC environment.

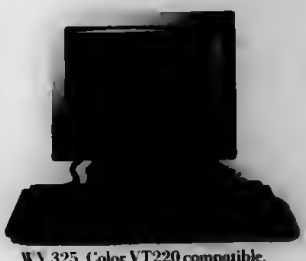
1. Plug.
2. Play.



WY-285. VT420 compatible.

WY-185. VT320 compatible.

WY-370. Color VT320 compatible.



WY 325. Color VT220 compatible.

Let's start with the newest DEC compatible terminal–the WY-285. It's plug-and-play compatible with your DEC VT420 *or* VT320 environment. And you wind up with an additional serial port, nonvolatile function keys and an 85 Hz refresh rate. All at a price that's knocked down a few notches. And so on down the line.

Unlike DEC, our color terminals come with ASCII compatibility and PC term modes. (Although our color terminals really can't be compared–because actually, they don't have a color terminal in this price range.) But DEC will service and support our full array of compatible terminals at your site.

There is one more step to add Wyse terminals to your DEC site and save money: call 1-800-GET-WYSE.

WYSE

©1993 Wyse Technology Inc. WYSE is a registered trademark and WY-285, WY-185, WY-370 and WY-325 are registered trademarks of Wyse Technology Inc. Digital, DEC VT420 and DEC VT320 are registered trademarks of Digital Equipment Corporation.

State spurs process revamp

By Gary H. Anthes
OLYMPIA, WASH.

A Washington state agency is nearing the end of a pilot project in business process redesign (BPR), and observers here say its results are so promising it is spawning similar efforts elsewhere in city, county and state governments.

"The state is aggressively pursuing BPR at a real high level now," said Suzanne Miles, manager of information services planning at the Department of Labor and Industries, where the state cut its BPR teeth. "After watching us, they are interested in using BPR in a number of areas."

BPR-inspired improvements in systems and manual procedures have reduced the time it takes the department to procure desktop information systems technology from three months to less than nine days, and the cost of procuring non-IS supplies by 25% to 38%, according to Dan Fannin, who co-managed the BPR project.

The results were deemed so impressive that the Department of Labor and Industries' director declared that the department would undertake no new systems development efforts unless preceded by a BPR, Fannin said.

Changes needed to realize the procurement improvements ranged from the fairly sophisticated to "no-brainers," Fannin said. For example, the Department of Labor and Industries is in the process of implementing these changes to its procurement systems:

- Collapse of t1 procurement processes into two.
- Automatic assignment of purchase order number. Previously, a user would have to log on to the procurement system and then telephone another office for manual assignment of a number before the order could be placed and the computer session completed.
- Combination onto one screen (from two systems) of orders to be filled from the state's or the department's warehouse.
- "Prepositioning," or warehousing, of items such as PCs whose demand can reasonably be forecast.

"The group came up with some terrific ideas that didn't cost a lot of money," said Joe Dear, until recently director of the Department of Labor and Industries and the main sponsor of BPR. "They did not recommend a lot of expensive technology in terms of electronic data interchange."

Under coverage

The state of Washington's Department of Labor and Industries, which is leading the state into business process re-engineering, provides industrial insurance to 130,000 employers covering two-thirds of the state's work force of 1.3 million workers. The agency has 2,500 employees and 20 field offices. It paid out nearly $1 billion in worker's claims in 1991.

To help pinpoint the most promising areas for BPR, the department first ranked a number of business functions on a three-dimensional scale that assessed customer satisfaction with the services, the services' importance to the organization and the ability of the organization to improve those services.

"Procurement had the highest user noise level," said Curt Pederson, former Labor and Industries IS director. Three- to six-month delays in getting PCs were due to unbelievably cumbersome procurement procedures, a diagram of which "looked like bow to build a nuclear reactor," he said.

Teams from all walks

The department put together teams that combined customers, service providers and IS people. "We kept our antennas up for people who seemed to color outside the lines," Fannin said. "We identified nine people — five customers and four service providers — who clearly demonstrated the ability to ask, 'Why are we doing this that way? Why are we doing this at all?' "

Fannin, one of two team leaders, was brought in from outside the department, and that gave him a valuable sense of detachment.

"You need that external person who is willing to call anybody's baby ugly because they don't care if they stay or not," he said.

The two teams were sent their separate ways with instructions to dream up the ideal procurement system without regard to cost, politics or anything else. "Then we came back together and guess what?" Fannin said. "The ideas were almost identical. Moreover, they matched what the state had spent the last God-knows-how-long trying to design the ultimate automated solutions."

Then the teams were sent off again and asked to come back with practical ideas that could be readily implemented while waiting for the state's long-term solution. "It was incredible what they came up with right out of the chute," Fannin said. "Some ideas were oriented to improving service, some to reducing cost, and some aimed at improving management awareness."

Low leader profile

Pederson, another key sponsor of the effort, said the project succeeded because its two project leaders downplayed their own visibility in favor of worker empowerment.

Pedersoo has since become acting director of central services for Thurston County, Wash., and he said he is eager to bring BPR to three county functions: auditing, property-value assessing and building permits.

Mapping out what to do was only 20% to 30% of the effort in the pilot BPR, Miles said. "But getting all the layers of approval, getting the involvement of stakeholders and getting commitment — that's what is taking the most time."

Miles said cultural barriers to the changes resulting from BPR are likely to be formidable in any organization, but in government, scrutiny and oversight from labor unions, legislatures and other regulatory bodies make change difficult.

But asked if BPR can make a substantial improvement in government, Miles said, "I'm tremendously optimistic because there is so much inefficiency in government in the first place. I think it's the only chance of getting any kind of control back into government services."

Executive Track

Allen Cournyer, senior vice president at **Texas Commerce Bancshares**, has been promoted to general manager at the bank's Consumer Credit Operations Center in Hedwig, Texas.

During the past several years, former data center manager Cournyer has presided over the successful rollout of the imaging-enabled commercial loan business.

Robert M. Rubin, information systems vice president at Elf Atochem North America, Inc. in Philadelphia, will assume the president's mantle at the **Society for Information Management (SIM)** on July 1.

Rubin takes the helm at SIM after years of service to the Chicago-based professional organization, including stints as a member of SIM's executive, finance and strategic planning committees and as chairman of the Philadelphia chapter.

In addition to Rubin, SIM's recently announced slate of directors for 1993-94 includes President-elect **Warren L. Harkness**, IS director at Framingham, Mass.-based Bose Corp., who will succeed Rubin as president in July 1994.

James R. Kinney, vice president of customer service systems at Kraft General Foods, is SIM's new vice president of finance.

William E. Eager, president and chief executive officer at First Bancorp of Ohio, will serve as vice president of chapter relations.

The new board also includes Communications Vice President **Harvey R. Shrednick**, senior vice president of IS at Corning, Inc.; International Relations Vice President **Donald A. Marchand**, who is dean at the School of Information Studies at Syracuse University; and Programs and Products Vice President **Edgar M. Frandle**, IS vice president at DataCard Corp.

Calendar

JUNE 20-JUNE 26

Mobile Computing Forum. Dallas, June 21-23 — Contact: Daniel J. Edelman, Inc., Mountain View, Calif. (415) 968-4033.

Network Security in the Open Environment. Washington, D.C., June 21-23 — Contact: Computer Security Institute, San Francisco, Calif. (415) 905-2310.

Advanced Program-to-Program Communication and Advanced Peer-to-Peer Networking (APPC/APPN) Platform Developers. Research Triangle Park, N.C., June 21-24 — Contact: Kay Sintal, APPC Market Enablement, Research Triangle Park, N.C. (919) 254-4460.

James Martin World Seminar. Atlanta, June 21-25 — Contact: Extended Intelligence, Inc., Chicago, Ill. (312) 346-7090.

M Technology Association Conference. Washington, D.C., June 21-25 — Contact: M Technology Association, Silver Spring, Md. (301) 431-4070.

The Road to ATM Conference. Washington, D.C., June 22-23 — Contact: Telecommunications Reports, Conference Department, Washington, D.C. (202) 842-3022.

Fourth Annual Worldwide Personal Communications ComForum. Alexandria, Va., June 22-24 — Contact: ComForum, Chicago, Ill. (312) 938-3500.

Winning Strategies for Upgrading AS/400 Systems and Storage Conference. White Plains, N.Y., June 24-25 — Contact: Reliability Ratings, Needham, Mass. (617) 444-5755.

JUNE 27-JULY 3

The Disaster and Recovery Symposium. New York, June 29-30 — Contact: Association for Information Technologies, Kings Park, N.Y. (718) 462-8484, ext. 206.

PC Expo. New York, June 29-July 1 — Contact: All Conference Travel, Fort Lee, N.J. (201) 346-0300.

The 11th Annual Conference on European Fiber-optic Communications and Networks. The Hague, Netherlands, June 30-July 2 — Contact: Information Gatekeepers, Inc., Boston, Mass. (617) 232-3111.

JULY 4-JULY 10

Client/Server and Distributed Database Management Systems. Troy, N.Y., July 8-9 — Contact: Office of Continuing Education, Rensselaer Polytechnic Institute, Troy, N.Y. (518) 276-8351.

JULY 11-JULY 17

1993 Banyan Technical Conference. Cambridge, Mass., July 11-13 — Contact: Banyan Systems, Inc., Westboro, Mass. (508) 898-1000.

11th National Conference on Artificial Intelligence. Convention Center, Washington, D.C., July 11-15 — Contact: American Association for Artificial Intelligence, Menlo Park, Calif. (415) 328-3123.

Follow these elaborate directions to save money in a DEC environment.

1. Pick up receiver.
2. Push 1-800-GET WYSE.

WY-285. VT420 compatible. WY-185. VT320 compatible. WY-370. Color VT320 compatible. WY-325. Color VT220 compatible.

There. You just saved 10%* on your terminal purchase by choosing Wyse over DEC. Yet you still get plug-and-play compatibility (just choose the model you need from the menu above). And you still get on-site support and service from DEC. So you get a "risk-free" way to add terminals to your DEC environment.

What's more, you'll get more when you pay less. Wyse offers an additional serial port, nonvolatile function keys and an 85 Hz refresh rate. Not to mention the world's smallest terminal footprint beneath a sleek, ergonomic design. If you haven't picked up the phone yet, you're losing money.

WYSE

*Quantity savings may vary. ©1993 Wyse Technology Inc. WYSE, WY-285, WY-185, WY-370 and WY-325 are registered trademarks of Wyse Technology Inc. Digital, DEC VT420 and DEC VT320 are registered trademarks of Digital Equipment Corporation.

"DISK COMPRESSION IS INHERENTLY MORE FRAGILE... ...USERS OF COMPRESSION SHOULD HAVE A COPY OF NORTON UTILITIES 7.0."

PC Week - May 10, 1993

Peter Norton, the leader in data recovery software

The new compression technology can put you in a squeeze. You wanted the efficiency, but now you're worried about losing data.

Here's some news that might help you relax. No other single product gives you the complete compressed data protection of Norton Utilities® 7.0.

It's the only utility specifically designed to recover data from DOS 6.0 DoubleSpace, Stacker and SuperStor compressed drives. Only with our Speed Disk® feature can you truly defragment the drives, making your recovery a fast, painless process.

You also get the Norton Disk Doctor,® with its nine automated repair functions specific to compressed drives. Plus the new Norton Diagnostics, which analyzes and tests all vital system components, including memory, video, CPU, system boards, communication ports, keyboard, mouse and more.

You can't put a price on peace of mind. But we'll try. Take advantage of the offer below and discover the ultimate security of Norton Utilities 7.0. It just might get you out of a tight spot.

THE NORTON UTILITIES®
SYMANTEC.

Purchase DOS 6.0 and receive Norton Utilities 7.0 for only $99.00. Look for specially marked packages at your local dealer, or order direct by calling 1-800-453-1062 ext. AP91. Users of any previous version of Norton Utilities can upgrade to 7.0 for only $49.00 by calling the toll-free number above.***

*Offer good with proof of purchase for new and existing DOS 6 0 owners. Suggested retail price in U.S. dollars plus shipping and applicable taxes. Actual price may vary Offer good while supplies last. Valid in the U.S and Canada only For more information in Europe, call 31-71-353111. In Australia, call 61-2-879-6577. In Canada, call 1-800-465-2266. Everywhere else outside U.S., call 408-252-3570 The Norton Utilities, Norton Disk Doctor and Speed Disk are registered trademarks of Symantec Corporation Other names are trademarks of their respective holders. Compatible with Windows 3.0 and 3.1, DOS 3 3 and higher.©1993 Symantec Corporation All rights reserved.

Not quite ready for prime time

OOP shows lots of promise, but tool and training hurdles remain. Best advice: Start small and wait for more business-oriented class libraries before you invest heavily.

By Alan Radding

You'd think the entire industry was dropping Cobol. At some point, every publication crowding your mailbox has likely touted the promise of object-oriented programming (OOP). Even the general business press has joined the admiring throng, notably so in *BusinessWeek*'s September 1991 six-page cover story, "Software made simple."

Little wonder. OOP promises are many: reusable components, fast delivery times, high success rates for new applications and flexible programs.

But while OOP success stories — and there are many of them — are the main course on the computer industry luncheon circuit, information systems executives are not ready to swallow another magic pill for their software development woes. "I'm see-

Prime time, *page 109*

Prime concerns

We asked 161 Buyers' Scorecard respondents to answer a series of questions about OOP. Here are some of the results:

Code reuse

73% of respondents found that only half their OOP code was reusable in more than one application.

Legacy systems

54% of respondents considered it a "very" or "somewhat" important issue to integrate legacy systems with their OOP-developed applications.

Training

94% of respondents considered it a "very" or "somewhat" important issue to train staff in object-oriented languages and concepts.

inside

Our "Object primer" sheds light on OOP
page 111

NextStep nears land new Intel version
page 121

Smalltalk and C++ tools face off
page 118

It's curious what passes for interoperable computer systems these days.

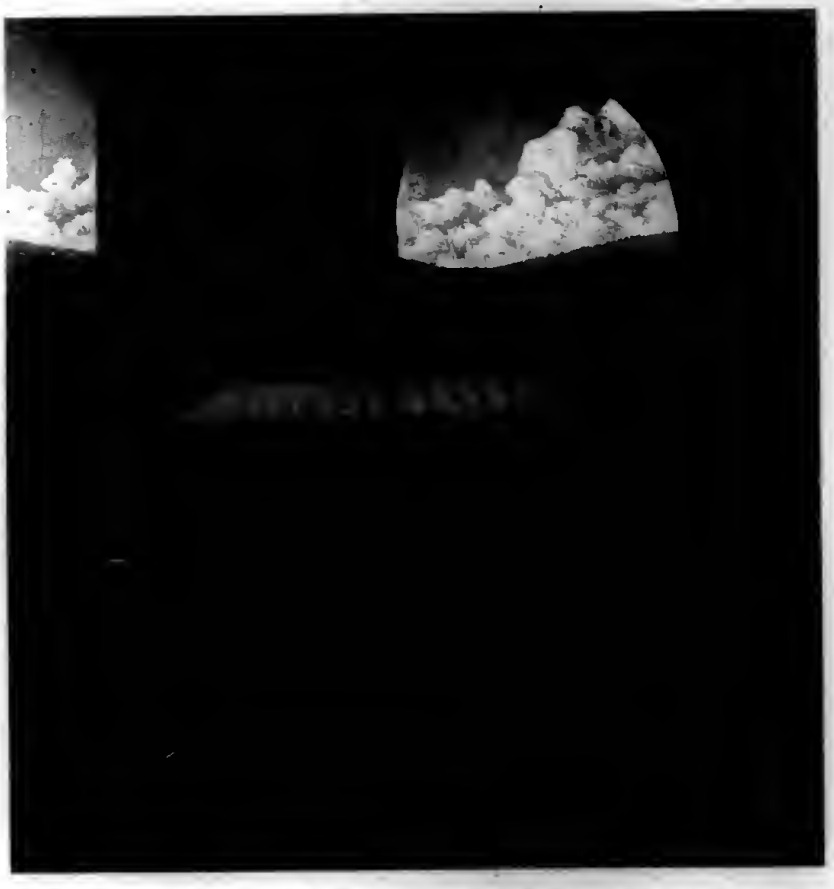
Lately, many computer makers are claiming, "Our systems are open." But their customers are asking, "Open to what? *Your* computer environment? Or ours?"

The point is well taken. Because computers should work with systems already in place, the customer's existing investment. And with systems yet to come, the customer's future investment. It's a big assignment—*interoperability*, enabling information to move freely across different computer environments.

Permit us to suggest a simple test. Ask your computer providers if their commitment to interoperability extends to a few of their offerings—or all of them. Ask if their commitment ends with UNIX® and PC operating systems—or anchors their systems architecture and corporate strategy. Total interoperability does not yet exist. But a total commitment to interoperability puts Unisys at the head of the industry—and gives our customers a head up on the competition.

Perhaps you hadn't realized that Unisys is a pioneer at delivering information solutions over open information networks. And among the first to appreciate that open systems are only one stop on the drive to interoperability.

"No supplier is doing more to respond to its customers' requirements for interoperability across an entire product line than Unisys," reports the Aberdeen Group. We've brought the benefits of interoperability to customers such as The Limited, the State of Ohio, Banque Bruxelles Lambert, and more. It's all part of our focus on the customer. And a prime reason 60,000 Unisys customers in 100 countries rely on us for solutions to fit their needs. Not merely our own.



UNISYS

We make it happen.

Call us at 1-800-874-8647, ext. 171. Whatever shape your systems are in, we can shape a solution equal to the challenge.

©1992 Unisys Corporation

UNIX is a registered trademark of UNIX System Laboratories, Inc

Prime time

CONTINUED FROM PAGE 107

ing the same things I osed to see at the CASE conferences, even [the same people], citing the same 10-times increases in productivity," says Olin Redmon, manager of development technologies at Glaxo, Inc. "There's a lot of hype."

More exploration than production

That doesn't mean the worldwide pharmaceutical company isn't doing its share of exploration. Isolated uses of OOP are scattered throughout Glaxo, and Redmon's group plans to pilot some projects in the near future.

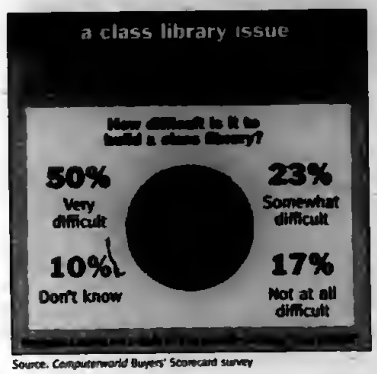
But at this point, there is more tire kicking than OOP production. In a recent study conducted by Index Summit, a research and advisory service of CSC Index, Inc. in Cambridge, Mass., 42% of North American respondents were researching OOP, compared with only 6% in production development. Of those moving forward with OOP, the majority are independent software developers and consultants.

Still, the benefits of reuse and the promise of programmer productivity are too great for corporate developers to pass up. In a recent *Computerworld* survey of 161 OOP users, 64% said programmer prodoctivity increased by up to 50% through the use of OOP methods.

The Enterprise Information Systems Group at Hughes Aircraft in Long Beach, Calif., has built five systems for the Air Force using tools from ParcPlace Systems, Inc. The applications — primarily accounting and human resources programs — have progressed so well, says J. L. Godwin, senior consultant for IS, that the group was given the go-ahead to prebuild common business objects from which new applications will subsequeotly be assembled without the need to write moch new code at all.

see In Depth starting on page 127

This and other experiences demoostrate why smart companies shouldn't ignore OOP, but they also suggest why it's important to balance promise with reality. "There are a bunch of hurdles," says Stuart Woodring, director of software strategy research at Forrester Research, Inc. in Cambridge, Mass. The largest of these is not technology but the cultural leap from traditional procedural programming to OOP and the resulting retraining and investment it requires.



Source: *Computerworld* Buyers' Scorecard survey

Plenty of products

The tools themselves are pouring ooto the market. "We're seeing the tools coming together," says Jerrold Grochow, chief technology officer at American Management Systems, Inc. in Fairfax, Va. Numerous vendors provide basic integrated development environments for C++ and Smalltalk. These eovironments comprise editors for revising code, debuggers for tracing and correcting errors and browsers for analyzing the structure of the code and the relationships of the objects. They also include basic "class libraries," which contain low-level objects.

Microsoft Corp.'s Visual C++ and ParcPlace Systems' VisualWorks are typical of the OOP environmeots available to users. Other products, such as Inference Corp.'s ArtEnterprise, bring some artificial intelligence capabilities to OOP, allowing developers to create, in effect, intelligent objects that have some of the reasoning capabilities of expert systems.

On the whole, however, OOP tools are far from mature. For one thing, you can mix and match class libraries, browsers and debuggers only with great care and effort. What's more, a key product category — off-the-shelf, business-oriented class libraries — is severely lacking.

A need for more class libraries

Class libraries eliminate a lot of the preliminary work that goes into building an object. Essentially, they are collections of predefined categories that developers can immediately start populating with objects. As more class libraries become available, corporate developers can spend more time assembling applications from prebuilt classes and less time writing, testing and debugging new classes of objects.

There are class libraries available today that provide low-level components. Sometimes referred to as interface classes, these products provide basic program components such as graphical user interface (GUI) buttons or the rectangles and circles used to create GUI components. There is also a number of control-class libraries that perform middleware functions, such as generating a SQL query.

While these classes are useful, they do not free the developer from having to design and build the business functionality almost from scratch. That woo't occur until developers have access to high-level (domain) class libraries consisting of business domain objects, such as a "bond" or "equity." Then the developer can assemble the application by connecting predefined classes and filling them with the objects.

"When we get off-the-shelf [domain] class libraries, that will turbocharge everything," says Nick Vitalari, vice president/director at Index Summit.

Low-level libraries available

"There are good [lower level] class libraries available for things like string classes or collectioo classes," says Philip Meese, director of technical services at Mercury Technologies, Inc., a New York-based consultancy specializing in financial applications. Meese uses Centerline Software, Inc.'s Object Center development environment for Unix with lower level class libraries from Rogue Wave Software, Inc., but he builds his own financial domain classes for things soch as bonds and futures.

The high-level class libraries that do exist may also be difficult to incorporate into your

Prime time, *page 116*

Quiz

Object-oriented databases: Are they for you?

By David Baum

Object-oriented databases are excellent for some types of applications, but they're not for everyone. With relational technology's maturity, wide availability and support, object databases have some catching up to do before they are the technology of choice.

Take the following quiz to see which database technology is for you. When you're finished, turn to page 116 to tally your score.

David Baum is a Santa Barbara, Calif.-based writer who specializes in application development.

1 Are you going to store video clips or other structured multimedia information in your database?
yes no

2 Do you need to store design information from CAD, CAM or CIM applications?
yes no

3 Do your applications primarily access simple tabular data for things such as personnel records, general ledgers and tax tables?
yes no

4 Does your application make use of richly structured, deeply nested information, such as a bill of materials with 300,000 components?
yes no

5 Do you have extremely large amounts of data, in the multigigabyte range?
yes no

6 Are the database applications you create going to be used by many (more than 50) concurrent users?
yes no

7 Do your needs call for unstructured, on-the-fly, ad hoc queries?
yes no

8 Is a standard data access language important to you?
yes no

9 Are you developing mission-critical OLTP applications that will bring the business to a standstill if the application fails?
yes no

10 Are you using object-oriented application development tools?
yes no

11 Do you need a platform other than Unix?
yes no

Scoring, page 116

Developing client/server applications doesn't have to be a nightmare.

The issue isn't whether to develop client/server applications–the question is *how.* How do you combine the expertise of PC and mainframe developers into productive teams to deliver large-scale client/server systems quickly?

INTERSOLV's interchangeable, yet integratable desktop development solutions put your resources to work today building real-world client/server applications. Your teams can exploit new application architectures, including GUIs and cooperative processing, without retraining in new technologies or languages. Unlike other tools, INTERSOLV solutions automate all of your real-world development needs: from GUI clients to enterprise-strength transaction management and host processing.

INTERSOLV manages the complexities of distributing data and function across multiple tiers in a cooperative processing environment. Your workgroups are free to focus on more important things: designing friendly graphical interfaces and addressing the real business needs. All of which gives you the competitive advantage!

INTERSOLV's desktop development solutions give you secure, real-time information sharing via a LAN repository, flexible support for the way you work, and the ability to reuse your existing applications... and your nights free from the LU6.2 demons!

For more information about INTERSOLV products, call TOLL-FREE 1-800-777-8858.

INTERSOLV

Desktop Development Solutions

Copyright © 1993 INTERSOLV, Inc. All products mentioned are trademarks and/or registered trademarks of their respective companies.

Object primer

Two important things to know about objects

"I'm alive."

You can understand objects better by thinking and talking about them in the first person: "I know my own. . . ." and "I can . . . myself."

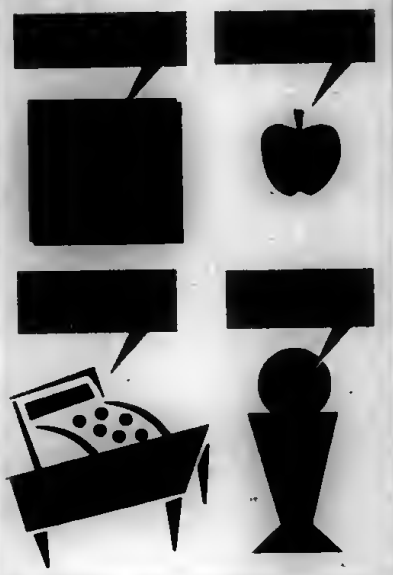
"I'd rather do it to myself."

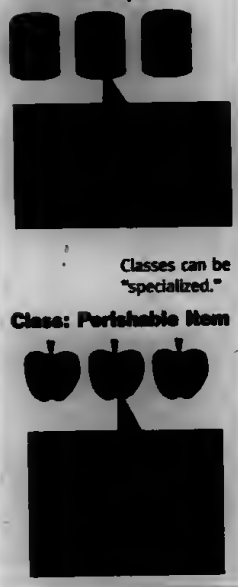
You can work with objects more effectively when an object acts upon itself.

what is an object?

An object is a person, place or thing. When brought to life, it knows things (called attributes) and does things (called services).

A group of like objects make up a "class."





Classes can be "specialized."

three key concepts

Encapsulation

The principle that an object should hide things from other objects, limiting visibility about what "I know and do."

Inheritance

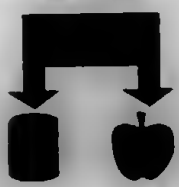
The principle that a class can extend from another previously defined class. The guiding principle is to organize the classes according to generalization/specialization.

Class: Item "I'm an item."

Class: Perishable Item "I'm a perishable item."

Polymorphism

The principle that objects in different classes may understand the same message yet respond in different ways.



"I do it my way."

"I do it my way."

how objects make programming more effective

Structured development

Analysis, design and coding take place in the traditional "waterfall" way. Each step is isolated from the other. Working results can take two or more years to see.

Object-oriented development

One environment/model is used from concept to code. Because one underlying model is used, teams apply analysis, design and programming concurrently.

Source: Peter Coad, Object International, Inc, Austin, Texas
For a free objects poster, call (800) 662-2667 or fax (512) 795-0332 ($4 shipping and handling).

Where 4GLs fit in

Fourth-generation languages (4GL) are often grouped in the same category as object-oriented programming (OOP) tools. But while these products are likely built using OOP techniques, and while they produce applications with object-oriented characteristics, such as GUIs, they are essentially procedural tools.

Still, some 4GLs may provide an effective transition to OOP. Powersoft Corp.'s "PowerBuilder has some object flavor to it," says Olin Redmon, manager of development technologies at Glaxo, Inc., a worldwide pharmaceutical firm. "It might make it easier for us to begin OOP than learning C++."

Other 4GL vendors are adding object capabilities to their tools. Gupta Corp.'s SQL Windows 4.0, for example, provides multilevel inheritance, polymorphism and encapsulation. The company is even shipping a basic class library with the product.

4GLs can be useful in the right circumstances. "4GLs represent a progression beyond procedural programming. We're seeing a refining of 4GLs to comply with OOP requirements," says Dick Dionne-Keay, an industry analyst at Summit Strategies, a market research firm in Boston. "The important thing," he continues, "is not that the tool be object-oriented per se but that it give MIS shops the benefits of OOP."

ENTERPRISE MANAGEMENT

Managing Change and Complexity

Two opposing forces in modern business are on a collision course: the need for specialized, localized hardware and software solutions, and the need to cost-effectively unite those information resources into a manageable business asset.

As IT managers respond to this challenge, they must cope with explosive growth in the number and diversity of devices and systems. Enterprise systems are becoming profoundly more complex.

Organizations today have a mixture of older, centralized systems and new, distributed systems—a wide variety of technologies provided by an even larger number of vendors.

The challenge is managing this diverse collection of resources. The nature of the problem requires a "best-of-breed" multi-vendor solution.

That's why the leaders in information technology listed here are committed to creating and providing Enterprise Management solutions.

What Is Enterprise Management?

Enterprise management is a strategy for integrated monitoring, measurement and control of multi-vendor networks and computer systems to serve enterprise business needs. It is a technological framework into which multiple management tools, applications and displays can fit, providing end-to-end management of network elements and resources.

Enterprise management requires an organizational commitment to, and consensus on, a common open management platform and a set of open management standards for use throughout the enterprise.

The Benefits

Implementing an enterprise management strategy provides considerable benefits:

- Continuously high levels of reliable and responsive service.
- Smooth incorporation of new client-server solutions with existing mainframe approaches. Your investment in existing mission-critical applications is preserved and augmented.
- Change and increasing complexity can be accommodated more quickly, without jeopardizing system and network availability.
- Greater optimization of network and system resources ensures high quality service is maintained at the lowest possible cost.
- Automation of management processes allows systems administration and operational costs to reduce steadily as your enterprise grows.
- Network and data security is enhanced.

What You Can Do Today

To achieve the benefits of enterprise management, take these steps:

- Develop organizational consensus on a strategy and on a management platform:
  - working with your key vendors and carriers, develop a strategy for implementing this enterprise management architecture within your organization.
  - establish purchasing guidelines that all parts of your organization can follow so that their evolving information systems can fit into the enterprise management approach.
- Select a common open management platform for use across your enterprise that:
  - enables management of products and services from multiple vendors.
  - is standards-based.
  - enables integration of management tools and applications from multiple vendors.
- Review existing management tools and interfaces and prioritize upgrades that move the organization toward enterprise management in the most cost-effective and rapid manner possible.
- Favor distributed and object-oriented management solutions.
- Use management solutions that incorporate open management standards such as the Simple Network Management Protocol (SNMP), the Common Management Information Protocol (CMIP) and the OSF's Distributed Management Environment (DME).
- Automation is a key element in effective enterprise management. Move toward "self-managed" systems.
- Require the use of open management protocols in new information system purchases and deploy open management protocols in existing network elements, distributed systems and vendor-specific management systems.

Contact the leading vendors listed here. They can provide you with additional information on the enterprise management strategy that's right for your organization, and the products and services you need to implement it.

SOURCES OF ENTERPRISE MANAGEMENT SOLUTIONS

CiscoWorks — a comprehensive series of SNMP-based router management applications — enables users to easily manage, monitor and administer Cisco internetworks. 1-800-553-NETS
▼●■ ⅄

IBM and the International Alliance Members lead the way in solving customers' management problems today, delivering SystemView conforming products, offerings and services. Call us at 1-800-IBM-4674,(ext65)
⅄■▲✕

OpenVision products and services overcome the barriers to deploying production applications in distributed environments by addressing operations, performance, storage and security. 1-510-426-6400
■✕■

TECHNICALLY ELITE CONCEPTS

Technically Elite Concepts offers fully integrated LAN & WAN monitoring hardware and software applications with RMON based Ethernet and Token Ring solutions. 1-800-659-6975
▼●■⅄✧✦

COMDISCO SYSTEMS, INC

BONeSP family of graphical simulation software tools to design, analyze, and predict the integration and expansion of Enterprise Networks 1-415-574 5800
▼■/●❩

INTERCONNECTIONS

Leverage for NetWare integrates NetWare LANs and VAX/VMS systems, providing File Sharing Services, Network Print Services, and Terminal Emulation Services (TES) 1-800-950-5773
✦

PLATINUM TECHNOLOGY

PLATINUM technology offers a complete set of software tools and utilities for DB2, CMF, and other IBM databases, as well as innovative client/server tools. 1-800-442-6861
❩

Ungermann-Bass

Ungermann-Bass, the leading global enterprise network innovator, is the dominant supplier of network management software and high-end intelligent hubs. 1-800-777-4LAN
■⅄▲✧✕❩

American Power Conversion

APC is the leader in power protection for networks. APC solutions include: UPS systems, automatic shutdown and monitoring software, and remote management via SNMP. 1-800-800 4APC
▼●■⅄✧✦❩

Data General

Providing the tools to build your enterprise management foundation. For information, call your local Data General sales office or 1-800-DATA GEN.
✕■

J&L

J&L's X-Server, developed to manage and monitor ChatterBox systems in a Novell network, can be accessed from any SNMP management station
1-818-709-1778
✦

SNMP Research

Produces a family of network management products based on SNMP, SNMP Version 2, and other protocols including agent and network management station source code. 1-615-573-1434

UNISOL SOLUTIONS

UNISOL Site Management Utilities perform system and network management, security auditing, backup and restore, performance monitoring and resource accounting charge back. 1-310-542-0068

ACD computing devices, inc.

ACD provides UNIX software platforms to deliver integrated applications for the 5 Specialized Management Functional Areas. Fault, Configuration, Performance, Security and Accounting 1-812-232-6051
■☆▲●

DEMAX SOFTWARE

With SecureMax and System Detective, DEMAX Software is the market leader in providing centralized security management solutions for networked UNIX and VMS environments. 1-800-283 3429
■●

LANDMARK

The leader in enterprise performance management for IBM mainframe and multi-platform UNIX environments. Our products are integrated through a unique client/server architecture 1-800-488-1111
■⅄✕●

SSDS

The DESC. SSDS' enterprise-wide system management architecture; integrates heterogeneous net management platforms /software/applications, providing truly distributed systems management.
1-800-NET-DESC
▼■⅄/▲✧✕●❩

UNIX SYSTEM LABORATORIES

Distributed Manager™ solves the problem of managing users, software, printing, data backup and the myriad of administrative tasks across distributed systems. 1-800-828-UNIX
●/✧✕■

Management Solutions

- Network Management
- Systems Management
- Automation
- Enterprise Integration
- NetWare to VMS
- Network Simulation
- Power Management
- RMON Agents
- Security
- SNMP v2
- Trouble Ticketing
- Unix Management

ascom Timeplex

Unified architecture, intuitive management, and global support for robust enterprise networks that are simple to install and easy to operate 1-800-669-2298
■▲✕

digital

POLYCENTER solutions provide open multi-vendor system and network management. From UNIX to Windows NT, NetWare to OSI, Digital delivers integrated management. 1-800-332-INFO ext POLY
●▲✕

NetLabs

NetLabs is the leading independent supplier of standards-based network management solutions providing management platforms, development environments, and integrated applications. 1-800-447-9300
■⅄/▲✧✕●❩

SunConnect

SunNet Manager and the largest number of third party management applications available, provide system managers with distributed management solutions for complex heterogeneous networks
1-800-241-CONX
▲●

WOLLONGONG

Wollongong's PathWay networking products give users of desktop computers access to computing resources over any departmental LAN or corporate network. 1-800-872-8649

Northeast Consulting

Developing enterprise wide network and system strategies and architecture to help users and vendors create dynamic competitive advantage 1-617-570-0780

Publication

COMPUTERWORLD

The weekly newspaper for Information Systems, delivering news, application information and product reviews for IS professionals responsible for implementing new technologies in their organization. For subscriptions call 1-800-669 1002

CABLETRON

SPECTRUM is Cabletron Systems' protocol independent management system for proactive monitoring and control of multi-vendor, enterprise-wide networks. 603 332 9400
▼■⅄✧✕●

EcoSystems Software, Inc.

EcoSystems provides integrated systems management software for client-server computing. Manage relational databases, UNIX computers, and networks from a central console 1-800-368-4ECO
■✕●

NETWORX

The critical first step in Enterprise Management a problem control Paradigm automates your workflow process, providing an effective resolution strategy. 1-206-646-1898
■/▲✦❩

Sun

As part of the COSE specification, Federated Services integrates enterprise-wide naming, filing, security services and networking in heterogeneous environments. 1-415-336-6755
●

Organizations

Candle

Making systems perform with OMEGACENTER™ open enterprise management with OMEGAMON® analysis, OMEGAVIEW™ status displays, and Automated Facilities™ 1-800-332-3235
■✕

Fibronics

Fibronics provides InterView NMS for enterprise network management; PowerMIB development toolkit for integrating third party SNMP devices; and intelligent hubs and FDDI solutions. 1-800-327-9526
■

NOVELL

NetWare Management System for multi-vendor networks provides an integrated, scalable, system using Novell and third party developed management applications. 1-800-554-4446
■⅄✧●

SynOptics

SynOptics provides customers with powerful distributed solutions for managing intelligent hub-based enterprise networks running Ethernet, Token-Ring, FDDI or ATM. 1-800-PIO-NTWK
■⅄✧●

NM Forum, a consortium, sponsors OMNIPoint, a multi-technology, multi domain blueprint for end-to-end service management of LAN/WAN Networked Information Systems. 1-908-766-1544

OSF

The Open Software Foundation is a non-profit software research and development organization working to further open systems development and adoption. Call OSF Direct Channels, 1-617-621 7300

Access Media

CHIPCOM

Our fault-tolerant intelligent switching hubs and other networking products are specifically designed for facility networks — building or campus wide — without failure or downtime. 1 508 460-8900
●■⅄/✕●

HEWLETT PACKARD

HP and HP OpenView Solutions Partners deliver 180 integrated management solutions that give you management control of the networked systems in your enterprise. 1-800-637-7740
■▲✧✕

olicom

Olicom's interoperable solutions, including Token-Ring bridges and hubs, support enterprise-wide networking with built-in management features and SNMP support 1-214-423-7560
✦

SYSTEMS CENTER

Building standards-based, object-oriented management solutions for today's enterprise systems and for the transition to the client/server systems of tomorrow
1-800-533-5128
●⅄▲✧✕

Access Media is an interdisciplinary think tank that takes a proactive role in the marketing of advanced technologies. We implement interdependent marketing campaigns that accelerate the adoption of key emerging technologies and concepts. These campaigns are cooperatively sponsored by an industry's leading vendors, end users and organizations. For more information call 310-450-7941

© 1993 Access Media Inc. 2015 Main St. Suite 200 Santa Monica, CA 90405
Commercially funded by the featured companies.
All logos are registered trademarks of the respective companies.
Photos courtesy of QMC Pentadim. Candle and IBM

Partnership Legend

- ▼ Cabletron Spectrum
- ● Digital POLYCENTER
- ■ Hewlett-Packard OpenView
- ⅄ IBM NetView/6000
- ❩ IBM SystemView
- ✓ NetLabs/Overland
- ▲ NMF OMNIPoint
- ✦ Novell NMS
- ✕ Open System Foundation DME Migration
- ■ SunConnect SunNet Manager
- ❍ Ungermann-Bass NetDirector Solutions
- ✪ Unix Systems Labs Distributed Manager

ACT NOW!

Contact these vendors today! Fax to: 206 251 8599

Name (Please print or type)

Title

Company

Address

City

State

Zip

Telephone

I AM AN:
❑ End User ❑ Reseller
❑ Vendor ❑ Other

IMPLEMENTATION PLANS:
❑ Evaluating
❑ Planning to Implement
❑ Pilot Program
❑ Implementing

PURCHASE INTEREST:
❑ Information only
❑ Immediate need
❑ 3-6 mos.
❑ 6-12 mos.
❑ Budget Approved

❑ American Power Conversion
❑ Applied Computing Devices
❑ ascom Timeplex
❑ Cabletron Systems
❑ Candle Corporation
❑ Chipcom Corporation
❑ Cisco Systems
❑ Comdisco Systems
❑ Data General Corporation
❑ DEMAX Software
❑ Digital
❑ EcoSystems Software
❑ Fibronics International
❑ Hewlett-Packard Company
❑ IBM Corporation
❑ InterConnections
❑ J&L Information Systems
❑ Landmark
❑ NetLabs
❑ Netware
❑ Network Management Forum
❑ Northeast Consulting Resources
❑ Novell
❑ Olicom
❑ OpenVision
❑ Open Software Foundation
❑ Platinum
❑ SNMP Research
❑ SSDS
❑ SunConnect
❑ Sun Microsystems
❑ SynOptics
❑ Systems Center
❑ Technically Elite Concepts
❑ Ungermann-Bass
❑ UniSolutions
❑ UNIX System Laboratories
❑ The Wollongong Group
❑ Computerworld

More Information

Please send me additional information on tools I can order to help educate and enroll others in my company on the need for an Enterprise Management strategy.

❑ Scripted presentations in various formats.

❑ A full-color reference poster on Enterprise Management and the leading vendors.

My company is most interested in receiving more information on:

❑ Systems Management
❑ Network Management
❑ DME

Mail to: Access Media, c/o LDI, 19026 72nd Ave., South Kent, WA 98032 **EM-CW-C**

what's HOT

By Adrian Bowles

It's easier to put objects "on" the box than it is to put them "in" the box. And because no one wants to be left out of the current object mania, we're now inundated with products that are decidedly not object-oriented but still bear object labels. These products are frequently offered by vendors attempting to add an object appearance to aging technology, which is a poor use of objects with limited long-term utility.

On the bright side, there are several arenas in which object technology has made a significant impact (or promises to in the next few years). The best of these products come from three intersecting camps:

- New vendors that, with no significant legacy systems, are free to use the latest technology.
- The artificial intelligence community, which is now learning to commercially market the OOP application development tools it has been developing for years.
- Unix tool vendors, which turned to objects early on to meet the high expectations of Unix developers.

Operating systems: The true promise of objects is the construction of extremely flexible systems. To realize that promise, an environment should use objects from the lowest level system services all the way to the user interface. Today, Next, Inc.'s NextStep offers many of these features in an integrated package. The technology with the most promise is the Pink project at Taligent, Inc.

Distributed objects: The Corba standard from the Object Management Group simplifies the problem of distributing objects within and between platforms. It will be adopted by all serious vendors of object technology and facilitate the development of client/server applications. Today, Distributed Smalltalk from Hewlett-Packard Co. meets all Corba criteria.

Object-oriented modeling and methods: The most natural way to construct an object-oriented system is to first model the requirements and architecture using an object method. The key to maximum reuse is in model key objects at the enterprise level.

Crossover products and methods from AI: Two of the best application development environments are ProKappa from Intellicorp and ArtEnterprise from Inference Corp., two AI vendors.

Visual programming environments: Tools such as Digitalk, Inc.'s Parts, ParcPlace Systems, Inc.'s VisualWorks and Microsoft Corp.'s Visual C++ speed application development by providing a more abstract interface that requires less knowledge about the underlying technology.

Object-enhanced productivity tools: Powersoft's PowerBuilder 3.0 is a prime example of a product that has benefited from an overhaul to incorporate the spirit of objects. It features encapsulation and inheritance to let users develop client/server applications with reusable parts.

what's NOT

Object CASE: No vendor today offers a complete integrated computer-aided software engineering (CASE) product with the power of a tool like Information Engineering Facility from Texas Instruments, Inc. Most of the products are repackaged conventional tools with a new set of icons. Their developers do not use the object methods they claim to automate, and their tools offer functionality comparable to early-1980s CASE. Notable exceptions that actually support methods and were developed using object technology include Objectory from Objective Systems, Rose from Rational Systems, Inc. and Teamwork from Cadre Technologies, Inc.

Hybrids: Hybrids, such as Object-Oriented Information Engineering and object-Cobol, promise to preserve legacy investments. While this makes sense in situations where the legacy is an asset, sometimes it pays to move on to the newer technology without the drag of the old. Leading information engineering innovators are objectifying that technology, but most users are years behind these vendors. For its part, object-Cobol will ultimately fail to deliver significantly better systems because programmers will continue writing procedural code in object-Cobol.

Objects at the glass only: Any product whose only claim to object status is the use of a GUI has missed the point. Although GUIs make life more pleasant for the user, they do not make products more flexible.

Object wrapping: Encapsulating a conventional component so that it may be treated as an object is seen by some as a way to handle ailing legacy systems. In reality, though, wrapping poor code is a lot like wrapping fish: It won't take long to discover the truth about the contents.

The only time that code-wrapping makes sense is when you have high-quality, stable components to integrate or when the component is so important but brittle that a rewrite is not feasible and your new system will be object-oriented.

To methodology or not to methodology?

Many people hear the word "methodology" and groan. After all, it was the Achilles' heel of computer-aided software engineering. "Following the methodology" became an end in itself, and organizations lost sight of the real goal: to get an effective system out the door.

Now methodologies are popping up for object-oriented programming (OOP), and it's enough to make an information systems manager hesitate. Although OOP methodologies are supposed to be more flexible, whether to use one is still one of the more controversial topics among OOP developers. In a *Computerworld* survey of 161 OOP users, respondents were divided equally as to whether they used a methodology.

"Methodologies lead you into quicksand," says Cliff High, application systems development supervisor for the state of Washington's Department of Health. "We once spent three years following a methodology and ended up with a diagram that we couldn't code," something he's determined not to repeat with OOP, High says.

Nick Vitalari, vice president/director at Index Summit, a research and advisory service of CSC Index, Inc. in Cambridge, Mass., also rejects conventional methodologies in favor of "rapid prototyping that lets you fail fast and get into experiential learning."

Others, such as Jerrold Grochow, chief technology officer at American Management Systems, Inc. in Fairfax, Va., say, "You can do without a methodology for small-scale projects, but it's another thing to try to rearchitect a firm's systems using dozens or hundreds of developers. You need a structure to organize around."

Peter Coad, a methodology author, takes the middle ground. He rejects conventional methodologies as too heavy-handed for OOP. Still, "you want enough notation to communicate and a strategy that lets people be innovative," he says.

Different methodologies are considered better for different types of problems:

- Object Modeling Technique (Rumbaugh) is regarded as flexible and best suited for fast, iterative development.
- OOD (Shlaer Mellor) provides formal, rigid control of very large, complex projects.
- ObjectOry (Ivar Jacobsen) comprehensively supports analysis through maintenance, with well-defined mapping between the analysis and design models, according to Adrian Bowles, managing director at Atelier Research in Westport, Conn.
- Object-Oriented Design (Booch), Bowles says, supports both conventional and object-oriented languages and is suited for real-time environments and the defense industries.

OOP tool vendors align their tools with methodologies in one of two ways, Bowles explains. The first, which is less formal, is "notation support," where the tool recognizes the symbols and signs used in the design. The second, which is more rigid, is "notation and step support," in which the tool enforces compliance with the methodology.

When a product provides tight support for a methodology, consultants advise against substituting another method. "It would be a waste of effort to try to use Rational Rose without Booch," Bowles says. For tools that support notations but not methods, you can cherry-pick among multiple methods.

—Alan Radding

SYSTEMS MANAGEMENT

Meeting the new demands f
by Di tributed C mputing

Distributed systems demand the same level of management and availability that IS has historically provided in a mainframe environment. Yet the technical approach to distributed systems management is fundamentally different from that applied to centralized systems.

Hardware and software resources to be managed tend to be more numerous, widely-dispersed and provided by a wide variety of vendors. Put simply, old approaches to systems management cannot be incrementally extended to manage these new distributed systems. A new approach is required.

Why A New Approach Is Necessary

When compared to the centralized mainframe environment, tracking and intervention tools for distributed systems management still appear somewhat primitive - even as the number and variety of systems IS professionals must manage is increasing. At the same time, IS professionals are expected to provide backup and recovery services, fault isolation and repair capabilities, and updating procedures that provide levels of service similar to those users have come to expect from centralized systems. These demands all threaten to increase administrative and support expenses. And if these systems are poorly managed, there's a real chance such expenses may actually erase the cost reductions achieved through downsizing.

Effective distributed systems management addresses these issues. It provides the considerable business benefits of distributed computing within a context that allows for effective management of IT resources and costs.

What You Can Do Today

▶ Implement remote management solutions that bring the problem to the troubleshooter, not the other way around.

The Benefits

▶ Develop organizational consensus on an enterprise-wide open management platform that can interface with your legacy systems and newer distributed systems.

▶ Acquire management tools and applications for distributed systems that integrate with the open management platform you choose.

▶ Favor object-oriented management solutions.

▶ Place open management agents on systems, clients and servers throughout the enterprise that will communicate with your management platform.

▶ Take an application-oriented view towards the utilization of system resources. This allows you to target your management focus on areas likely to provide the biggest and quickest return to end users.

▶ Create automated responses to system problems - responses that automatically alert system managers when problems occur, or which resolve problems at the same speed they occur.

▶ In the switch from centralized to distributed processing, leverage the expertise, skills and methodologies of existing MIS personnel. And remember that legacy systems are likely to play a key role in mission-critical applications for many years to come.

The following companies are leaders in developing products and services that provide you with a solid foundation for effective distributed systems management. Contact them now for more information about the powerful systems management solutions they have to offer.

SOURCES OF SYSTEMS MANAGEMENT SOLUTIONS

!Candle

Making systems perform with OMEGACENTER™ open enterprise management with OMEGAMON® analysis, OMEGAVIEW® status displays, and Automated Facilities™. 1-800-332-3235

IBM

IBM products and services reflect a brand new approach to systems management, giving you the flexibility to manage your information processing environments based on the SystemView strategy. Call us at 1-800-IBM-6676 (x685)

NOVELL

NetWare Management System for multivendor networks provides an integrated, scalable, system using Novell and third party developed management applications. 1-800-554-4446

SunConnect

SunNet Manager and the largest number of third party management applications available, provide system managers with distributed management solutions for complex heterogeneous networks. 1-800-241-CONX

UNIX

Distributed Manager™ solves the problem of managing users, software, printing, data backups and the myriad of administrative tasks across distributed systems. 1-800-828-UNIX

digital

POLYCENTER solutions provide integrated multivendor system management. Digital is automating the management of MS-DOS, UNIX, Windows NT, and Open VMS. 1-800-332-INFO ext. POLY

LANDMARK

The leader in enterprise performance management for IBM mainframe and multi-platform UNIX environments. Our products are integrated through a unique client/server architecture. 1-800-488-1111

OPENVISION

OpenVision products and services overcome the barriers to deploying production applications in distributed environments by addressing operations, performance, storage and security. 1-510-426-6400

SYSTEMS CENTER

Providing enterprise management and software distribution solutions to support both your multivendor, distributed environment today, and your strategy for tomorrow. 1-800-533-5128

ACT NOW!

Contact these leading vendors today, to learn more about their Systems Management products and services. A coupon to request information from these vendors is included with the Enterprise Management advertisement earlier in this issue.

For an additional copy of that coupon please call Access Media at 310-458-7941

© 1993 Access Media Inc, 3015 Main St., Suite 200, Santa Monica CA 90405. Competitively funded by the featured companies. All logos are registered trademarks of the respective companies. Photos courtesy of DEC, Fujitsu, Candle and IBM.

Prime time

CONTINUED FROM PAGE 109

application. Because they tend to be compiler-specific, you can't assume a Smalltalk class library from ParcPlace will work with a Digitalk, Inc. compiler, for instance.

Rick Price, systems analyst at Cap Gemini America, Inc. in Atlanta, succeeded in mixing class libraries by sticking with compiler-specific classes when he could and avoiding compiler-specific code every place else, proving it can be done with effort.

Browsers and repositories

Even with class libraries, you can't take advantage of reusable code if you're not able to locate useful classes when you need them. That's where browsers and repository tools come in. But even here, the tools could be more mature. The few repository tools that are available offer only limited platform support and rudimentary features.

Browsers, which generally are integrated with the OOP environment, show you the classes in a given application. For example, they will show graphically how certain objects relate to other objects and display the inheritance. In other cases, you can simply list the classes used in the application.

Separate repository tools maintain the classes in a central location, making it easier for multiple development teams to share them. They also store semantic information about the classes, such as where, when and how they should be used.

While it's not absolutely necessary to have a repository, it's helpful when the number of classes and developers grows. Repositories are sold separately from OOP environments.

Southern California Edison in Rosemond, Calif., uses the Envy repository from Object Technology International, Inc. in Ottawa for its Smalltalk class libraries, which were developed with VisualWorks. The firm uses OOP to create applications that watch the flow of work across people's desks and alert them to things they should be doing. Harvey Kramer, manager of applied technology, likes the product because it "stores the classes in a database on the LAN and allows Smalltalk to grow beyond the single-user mentality."

Source: *Computerworld* Buyers' Scorecard survey

Difficult integration

Finally, developers face the problem of getting tools from different vendors to work together easily. Developers also report difficulty combining class libraries from different sources. You can do it, but only with great care. "These tools are really just in their infancy. At the next stage, the tools will speak to each other," Meese predicts. The eventual solution must take the form of a repository of object information that any tool can call upon, adds Steve McClure, manager of object-oriented technology at International Data Corp.

Standards will resolve some of the difficulty in combining tools and class libraries, but standards, as usual, are lagging. "We're going to have to live with a lack of standards for the next two to three years," Grochow notes.

The Object Management Group (OMG) made headway with its Object Request Broker and Common Object Request Broker Architecture (Corba), but Corba doesn't address how tools and libraries speak with each other. It defines how objects interact across the network and the mechanism by which users can tap objects elsewhere on the network.

Although developers are making progress with OOP, corporate IS has been slow to follow. That's likely because while you can find tools that let you build industrial-strength applications, they are far from easy to use. To use them, firms face a massive investment in training and outside help on top of the investment in the tools just to get to the point where they can begin to be productive. Having been burned by big investments in computer-aided software engineering that didn't pay off, people are finding it pays to be more cautious this time around. a

Radding is a free-lance writer based in Newton, Mass

Reuse not guaranteed

You can build the perfectly functional OOP application — but that doesn't guarantee you'll achieve the dream of software reuse. In that dream, application developers snap together complex applications using off-the-shelf, proven objects the way children build structures snapping together Lego pieces.

In a *Computerworld* survey of 161 OOP users, 73% said they were able to reuse only half of their OOP code in more than one application. And Brad Clements, president of Murkworks, Inc. in Potsdam, N.Y., a small software developer, built a number of DOS utilities in Borland International, Inc.'s C++ using OOP techniques. While the application works fine, "my concept of reusability was not correct," he says.

Because he was working in DOS rather than Windows, Clements was unable to take advantage of the class browser built into the Borland environment, which he says made life difficult. "When you can't see the inheritance laid out in a graphical way, you can't see if you made a mistake in the overall scheme," he says.

But the real problem was his lack of a methodology (see story page 114). A methodology, Clements suspects, would have helped him design his classes to optimize reuse.

The trick to reuse, according to Peter Coad, chairman of the OOP training and consulting firm Object International, Inc. in Austin, Texas, is to consider it from the very start and not make your initial domain classes too specific. For instance, a "buy" object should be built for applications ranging from investments to retail.

Chicago-based Andersen Consulting, for example, gets as much as 95% reuse in its OOP efforts, reports Steven Rothman, managing director for solution delivery programs, because "we start with the intent of making the objects reusable."

—Alan Radding

Quiz scores

Scoring for the object quiz, page 109

1. If yes, 5 points for object-oriented.

2. If yes, 5 points for object-oriented.
In any application dealing with complex data or data derived from real-world entities, an object-oriented database will win hands-down because of its superior modeling capabilities.

3. If yes, 3 points for relational.
The tabular, set-oriented representation of data in the relational model lends itself naturally to much of the information that floods the business world.

4. If yes, 3 points for object-oriented.
In an object-oriented database, information is tightly linked through object identifiers. Navigation among complex data sets — such as selecting a subset of 285,000 components for a particular engine — is efficiently handled with high-speed messages or pointers.

A relational database must use inter-table joins to accomplish the same results. This is cumbersome and can quickly bog down even the stoutest of processors.

5. If yes, 2 points for relational.
Relational is a better choice for simple data structures without a lot of complex join operations. Data is indexed for fast access.

6. If yes, 3 points for relational.
Object-oriented databases tend to freeze up with lots of concurrent access — typically more than 50 or 100 users, depending on the product.

7. If yes, 3 points for relational.
Relational DBMSs are very good at pulling up new relationships among the data. They are optimized for unanticipated queries. With an object-oriented database, data associations generally must be hard-wired through the database's pointers. You can do ad hoc queries with some object-oriented databases, but the technology is less mature.

8. If yes, 5 points for relational.
Object-oriented database interfaces tend to be language-specific. For the most part, each one declares its own interface protocol. Most are C++, which can be awkward if you are in any other development environment. In short, there is no equivalent to SQL in the object-oriented world, although standards efforts are afoot to remedy this situation.

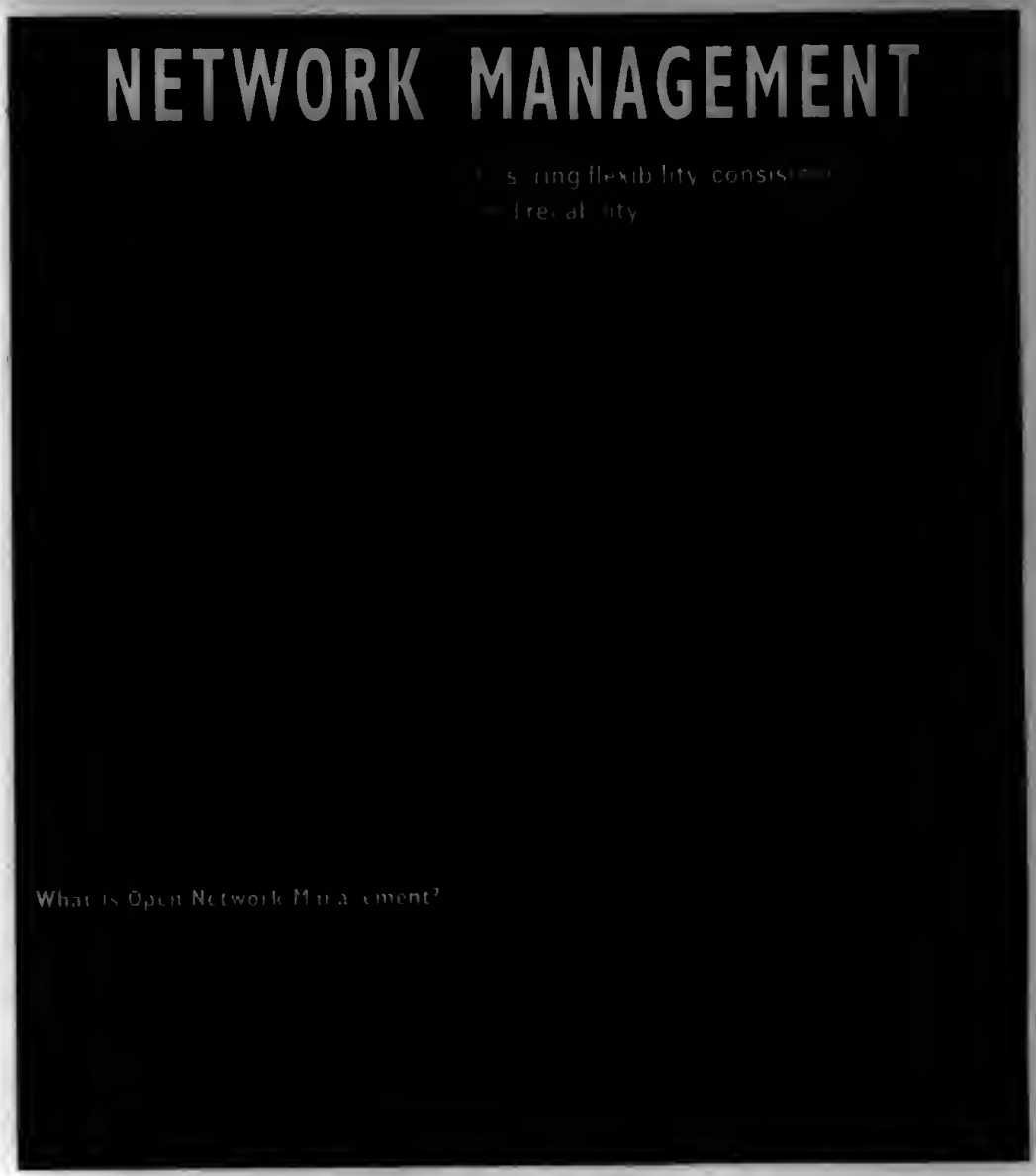
9. If yes, 5 points for relational.
This is the forte of relational databases. They are optimized for short, accurate transactions through mature rollback and recovery features. If the network goes down in the middle of your transaction, your data remains intact. Object-oriented databases lack the integrity features and support for large numbers of concurrent users that relational database vendors have had a decade to perfect in the commercial business world.

10. If yes, 5 points for object-oriented.
If you are moving toward object-oriented tools, ultimately you will want an object-oriented database to more easily access and store information in an object-oriented format. For example, if you have programs in Smalltalk or C++, you will have to go through a translation and mapping process to let data structures be stored in a relational database. You'll take a performance hit whenever you retrieve that data, and it's a lot more work to make it fit.

With an object-oriented database, inheritance of attributes and methods from one class of object to the next can be stored with the data itself and modified on the fly.

11. If yes, 3 points for relational.
The current crop of object-oriented databases runs mostly on Unix workstations and minicomputers. If you are using mainframes or PCs, better stick with relational. You will likely have to invest in some new hardware for your object-oriented database management system.

NETWORK MANAGEMENT



Even if your network copes with your enterprise needs now, is it prepared to handle the way your organization will move and use information tomorrow? Your network will need to support applications far more complex and powerful than those you're using today. And it will need to do this flexibly and reliably, across organizational and geographic boundaries.

Without an integrated, open approach to network management, building and managing a network that will evolve successfully to meet these demands is impractical. Without effective network management, cost control is impossible.

The Benefits

Networks have become a crucial determinant of enterprise efficiency and competitiveness, which is why effective network management is now more essential than ever to the health and success of your organization.

Network availability, for example, is essential to mission-critical applications such as customer service, inventory management, EDI and product development. Network management enables consistent, reliable network service that organizations can depend on. An integrated network management approach will enable your enterprise to quickly respond to requests for new services to meet evolving business needs. This is especially crucial in a period when use of network-based applications is growing rapidly.

Integrated network management provides a foundation for higher levels of automation of administrative and operational tasks. It also improves responsiveness to user needs while substantially lowering support costs. Integrating your network management solution into a broader enterprise management strategy is far more cost-effective than investing in closed, vendor-specific solutions on an ad hoc basis. And it provides your IS department with the information necessary to track costs and optimize network resources while maintaining desired service levels.

What You Can Do Today

- Address network management from a strategic perspective. Ad hoc solutions and their incompatibilities will ultimately cripple your network.
- Choose an open platform for managing your enterprise network that is compatible with other enterprise management choices. Gradually, eliminate proprietary management interfaces, instead choosing new equipment based on open standards such as SNMP and CMIP.
- Place standards-based management agents on existing network devices.
- Make the use of open management protocols a requirement for new network purchases.
- Acquire management tools and applications for networks that integrate with the open management platform you choose.
- Favor object-oriented network management solutions.

Contact the leading vendors listed here for more information. They are committed to helping you implement an integrated management approach to building and managing open, interoperable, multi-vendor networks.

SOURCES OF NETWORK MANAGEMENT SOLUTIONS

CABLETRON

SPECTRUM is Cabletron Systems' protocol-independent management system for proactive monitoring and control of multivendor, enterprise-wide networks. 1-603-332-9400

cisco SYSTEMS

CiscoWorks — a comprehensive series of SNMP-based router management applications — enables users to easily manage, monitor and administer Cisco internetworks 1-800-553-NETS

digital

POLYCENTER solutions provide integrated multivendor network management. Digital supports SNMP, OSI CMIP, NetWare SNA, and many other network components 1-800-332-INFO ext. POLY

NETWORX

The critical first step in Enterprise Management is problem control. Paradigm automates your workflow process, providing an effective resolution strategy 1-206-646-1898

SYSTEMS CENTER

Providing standards-based, object-oriented solutions for network management and for automated software and data distribution in multivendor, distributed systems 1-800-533-5128

!Candle

Making systems perform with OMEGACENTER™ open enterprise management with OMEGAMON® analysis, OMEGAVIEW® status displays, and Automated Facilities™ 1-800-332-3235

COMPUSCO SYSTEMS, INC.

BONeS® software to design, analyze, and predict network performance. Use actual traffic data from HP OpenView, SunNet Manager, LAN analyzers. 1-415-574-5800

IBM

Networking offerings from IBM are based on our SystemView strategy of providing integrated, multivendor solutions to your current and future network management needs. Call us at 1-800-IBM-6676 (x685)

SunConnect

SunNet Manager and the largest number of third party management applications available provide system managers with distributed management solutions for complex heterogeneous networks. 1-800-241-CONX

WOLLONGONG

PathWay Management Station is a TCP/IP network management product that supports SNMP with a unique, client-server, distributed architecture. 1-800-872-8649

ACT NOW!

Contact these leading vendors today to learn more about their Network Management products and services. A coupon to request information from these vendors is included with the Enterprise Management advertisement earlier in this issue.

For an additional copy of that coupon please call Access Media at 310-450-7941

© 1992 Access Media Inc. 2015 Main St. Suite 290 Santa Monica, CA 90405 Cooperatively funded by the featured companies. All logos are registered trademarks of the respective companies. Photos courtesy of DEC, Network, Candle and IBM.

Buyers' Scorecard: ParcPlace's Objectworks tops user satisfaction ratings

By Derek Slater

ParcPlace Systems, inc.'s Smalltalk compiler received the highest satisfaction ratings from its users in the Buyers' Scorecard survey of leading object-oriented programming (OOP) languages Smalltalk and C++.

ParcPlace's Objectworks Smalltalk earned an overall score of 77, followed by Borland international, inc.'s C++ 3.1 at 73, Microsoft Corp.'s C/C++ 7.0 at 71 and Digitalk, Inc.'s Smalltalk/V with a 70.

Each language has strengths. Smalltalk scored higher user satisfaction in reusability of code and support for inheritance. C++ earned higher scores in training time required and speed of developed applications.

Fully 65% of the respondents said their OOP products have delivered the expected cost savings or increase in productivity. But users also said there is a steep learning curve, which is reflected in the low satisfaction scores received in the area of training time required. The C++ products scored better than the Smalltalk products in that area.

COMPUTERWORLD BUYERS' SCORECARD

Smalltalk

ParcPlace's Objectworks Smalltalk garnered the highest ratings in a number of key categories, including ease of maintenance. Portability of applications is also a hallmark of the product, which supports a variety of PC and workstation operating systems.

Smalltalk has also been incorporated into a full application development environment, VisualWorks, introduced last October. VisualWorks adds a graphical user interface (GUI) builder.

Potential ParcPlace users must consider the price of the product: The full VisualWorks environment with Objectworks Smalltalk costs $2,995 for Windows and OS/2 and $4,995 for Unix. Without VisualWorks, Objectworks Smalltalk costs $2,495 for Windows.

Digitalk's Smalltalk/V users gave the product lower satisfaction scores than the ParcPlace product. Smalltalk/V did garner the highest rating of any product in inheritance support. It lagged in responsiveness of vendor service.

But Digitalk's implementation of Smalltalk costs $500 for Windows, $995 for OS/2 and only $125 for DOS. Like ParcPlace, Digitalk has also released new products that integrate with its compiler. The Parts Workbench ($1,995 for OS/2) lets users combine program components written in Smalltalk, Cobol and C. The $1,495 Team/V extension supports group development.

C++

Borland's C++ edged out its rival for the top C++ satisfaction rating, scoring higher in ease of maintaining applications and debugging features. The product also took higher marks in integration of tools and functions in the application development environment.

The two C++ products finished in a dead heat in responsiveness and quality of vendor service and support, while Microsoft's C/C++ users were more satisfied with its handling of inheritance.

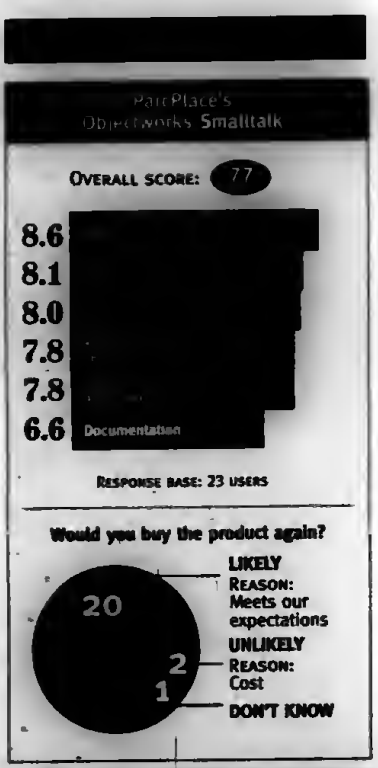
Microsoft will give Borland a run for its money as its Visual C++, the successor to C/C++, picks up steam. It includes a GUI-building component. The product runs under Windows and costs $499 for the professional edition. Borland's C++ compiler costs $495. ■

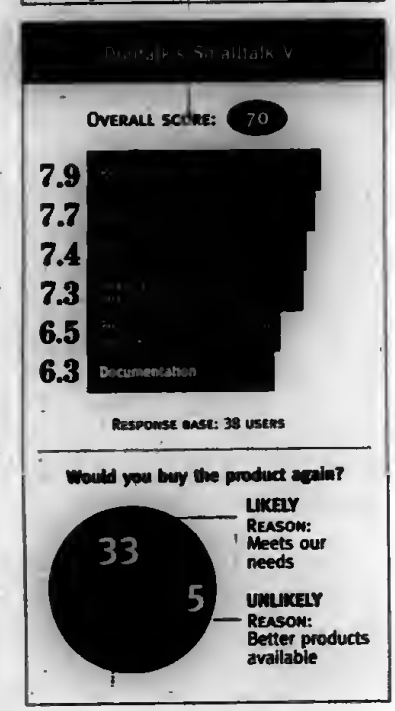
METHODOLOGY

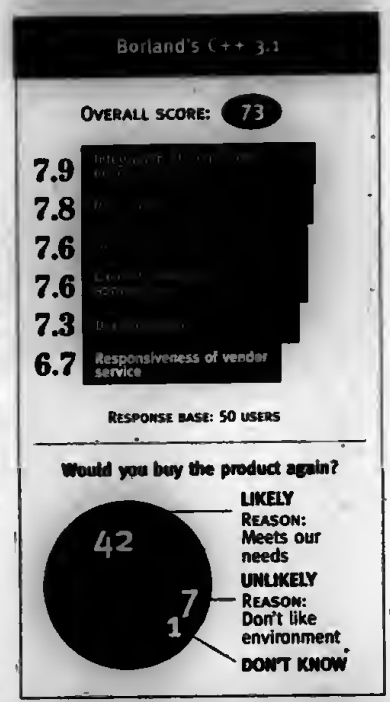
User names were obtained from nonvendor sources. First Market Research Corp., an independent market research company in Austin, Texas, conducted the survey and tabulated the results. The response base was 50 users each for Borland's C++ and Microsoft's C/C++, 38 users for Digitalk's Smalltalk/V and 23 users for ParcPlace's Objectworks Smalltalk.

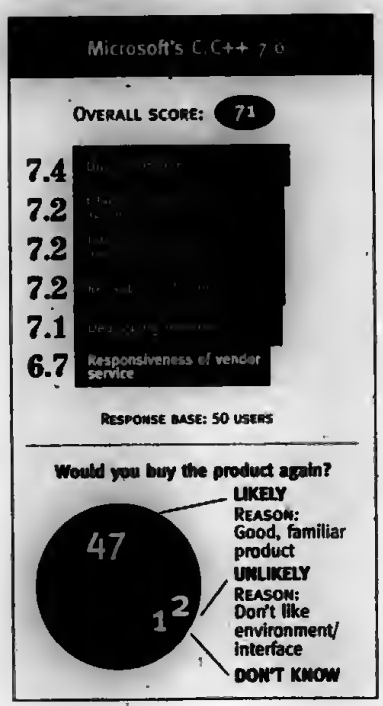
Users rated their satisfaction with their installed products and were not asked to compare or rate one product directly against another in the Scorecard.

Computerworld thanks the following individual and firm for their assistance in preparing this Buyers' Scorecard: Byron Hale, Effective Information; *Computerworld* Database Division.









DME Distributed Management Environment

A consensus-based solution to the creation of universal management standards

With the emergence of distributed, multi-vendor computing environments, the creation of a standards framework to facilitate their effective management became a top priority. As a result, leading vendors, working through the Open Software Foundation (OSF), have developed a set of open, vendor-neutral standards known as Distributed Management Environment (DME).

DME was conceived to get the most out of today's advanced distributed computing technologies, open standards, interoperability and object-oriented technologies. Its standardized framework represents an industry consensus on application program interfaces (APIs) and protocols for open management. DME is a 'living' standard, evolving as technologies evolve, enhancing the latest industry developments.

Why DME Works

DME builds on existing standards. It is not an alternative to other standards. Rather, it represents a complementary approach that encompasses existing SNMP and CMIP standards and endorses interfaces devised by the Network Management Forum, X/Open and others.

DME is the product of a multi-vendor, consensus-based process. As a result, DME maps to your computing environment and manages growth in multi-vendor systems and networks. And because DME is the product of industry consensus, it accelerates the process of reaching consensus within your organization.

DME is based on a comprehensive set of requirements developed through an open, industry process to meet specific objectives and address real needs.

DME is vendor neutral. It enhances competition in the management market. This will result in lower costs and better solutions for users.

The Benefits

DME's wide-ranging benefits include:

- A scalable, distributed architecture that can accommodate growth in multi-vendor networks and distributed systems.
- Better management, interoperability and integration through the implementation of common management services and standardized protocol and object definitions.
- Reductions in time and costs for system administration and training.
- Tightly integrated solutions utilizing object-oriented design, for easier and more flexible integration of scalable, distributed, multi-vendor architectures.
- Greater longevity of systems resulting from standards-based, backwards compatibility.

What You Can Do Today

No matter where you are in the development of your network, we suggest evaluating DME as you build your enterprise management strategy. Portions of the DME will be available during 1993 from a number of vendors. Complete implementations of DME will begin appearing in 1994.

Contact the Open Software Foundation for more information on DME and how it can provide you with a framework for managing growth in a multi-vendor systems and networks. Or, contact these leading vendors who have committed to supporting DME.

DME SUPPORTERS

Cabletron

SPECTRUM is Cabletron Systems' protocol-independent management system for proactive monitoring and control of multivendor, enterprise-wide networks. 1-603-332-9400

digital

POLYCENTER products deliver DME vision today, and provide the quickest path to full DME compliance. They provide open integrated systems and network management 1-800-322-INFO ext. POLY

IBM

IBM products designed to use the DME standards through the SystemView framework provide effective management solutions that adapt to your evolving, multivendor distributed computing environments. Call us at 1-800-IBM 6676 (x685)

OSF

The Open Software Foundation's Distributed Management Environment (OSF®DME) is enabling technology that simplifies the management of stand-alone and distributed computer systems. 1-617-621-7300

SYSTEMS CENTER

A DME Technology Provider leading the systems management industry in applying advanced technologies to ease your transition to client/server environments. 1-800-533-5128

Data General

Providing the tools to build your enterprise management foundation. For information, call your local Data General sales office or 1-800-DATA GEN

HEWLETT PACKARD

HP OpenView technologies provide key components of the DME. As the fast path to DME, HP OpenView is the right choice for solving your network and systems management problems today! 1-800-637-7740

NetLabs

NetLabs is the leading independent supplier of standards-based network management solutions providing management platforms, development environments, and integrated applications. 1-800-447 9300

OPENVISION

OpenVision products and services overcome the barriers to deploying production applications in distributed environments by addressing operations, performance, storage and security 1-510-426-6400

ACT NOW!

To learn more about these DME supporters contact them today. A coupon to request information from these vendors is included with the Enterprise Management advertisement earlier in this issue.

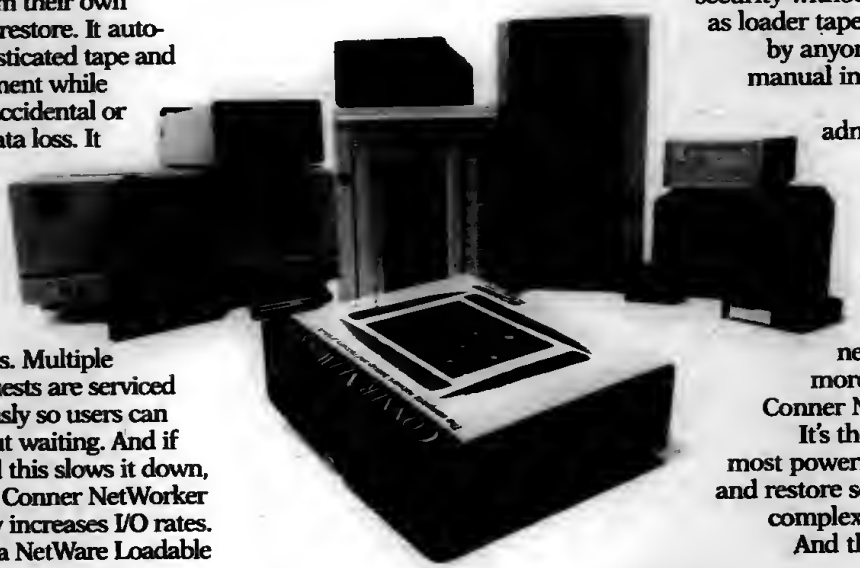
For an additional copy of that coupon please call Access Media at 310-450-7941

© 1993 Access Media Inc., 3015 Main St. Suite 300, Santa Monica, CA 90405 Cooperatively funded by the featured companies. All logos are registered trademarks of the respective companies. Photos courtesy of IBM, Netlabs, Cabletron and IBM

Fact:

The more complex your network grows, the simpler backup and restore becomes.

To some it's blasphemy. To others it violates a natural law. The fact is, backup and restore on complex networks can be dramatically simplified. But only with Conner NetWorker™ software. It frees the network administrator because end users perform their own backup and restore. It automates sophisticated tape and file management while preventing accidental or deliberate data loss. It manages and controls all backups from any workstation... even remotes. Multiple backup requests are serviced simultaneously so users can work without waiting. And if you think all this slows it down, think again. Conner NetWorker dramatically increases I/O rates. Running as a NetWare Loadable Module, Conner NetWorker supports up to 250 clients on 26 servers with minimal performance impact and includes automatic fault recovery. It's perfect for networks with ever increasing storage demands. It's perfect for mixed NetWare environments with UNIX, DOS and Macintosh systems. It drives today's most reliable, highest capacity backup devices and loaders from Conner, including Digital Linear Tape (DLT), 8mm and DAT. And now you have security without sacrifice as loader tapes are used by anyone without manual intervention while the administrator controls access to each individually. The larger your network, the more you need Conner NetWorker. It's the simplest, most powerful backup and restore solution for complex networks. And that's a fact.



Introducing Conner NetWorker.

The most powerful data management software for complex networks.

1-800-755-0535

yes NetWare Tested and Approved

CONNER

The Storage Answer.

Maynard is now Conner.

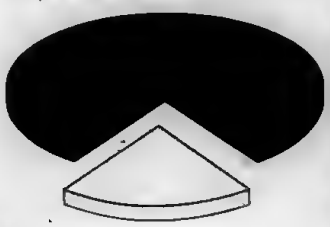
Conner NetWorker is a trademark of Conner Peripherals. All other product and company names herein mentioned may be trademarks or registered trademarks of their respective companies.

FREE
order application software and upgrade to support Novell NetWare 4.0 with all Conner NetWorker purchased by August 15th

Take a slice off the price of Computerworld.

51 issues for only ~~$96~~. *Now only $42.95*

❑ Save me a slice. I accept your offer of $42.95* for 51 issues, a savings of over $5.00 off the basic subscription price of $48.



First Name MI Last Name

Title Company

Address

City State Zip

Address Shown ❑ Home ❑ Business ❑ New ❑ Renew Basic rate: $48 per year

* U.S. Only. Canada $74.97, Central/South America $130. Europe $195, all other countries $295.
Foreign orders must be pre-paid in U.S. dollars.

Please answer the questions below in order to qualify for this offer.

1. BUSINESS/INDUSTRY (Circle one)
10. Manufacturer (other than computer)
20. Finance/Insurance/Real Estate
30. Medical/Law/Education
40. Wholesale/Retail/Trade
50. Business Service (except DP)
60. Government - State/Federal/Local
65. Communications Systems/Public Utilities/ Transportation
70. Mining/Construction/Petroleum/Refining/Agric.
80. Manufacturer of Computers Computer-Related Systems or Peripherals
85. Systems Integrators, VARs, Computer Service Bureaus, Software Planning & Consulting Services
90. Computer/Peripheral Dealer/Dist./ Retailer
95. Other_____
(Please Specify)

2. TITLE/FUNCTION (Circle one)
IS/MIS/DP MANAGEMENT
19. Chief Information Officer/Vice President/ Asst. VP IS/MIS/DP Management
21. Dir./Mgr. MIS Services, Information Center
22. Dir./Mgr. Tech. Planning, Adm. Svcs., Data Comm. Network Sys. Mgt., LAN Mgr., PC Mgr.
23. Dir./Mgr. Sys. Development, Sys. Architecture
31. Programming Management, Software Developers
41. Engineering, Scientific, R&D, Tech. Mgt.
60. Sys. Integrators/VARs/Consulting Mgt.

CORPORATE MANAGEMENT
11. President, Owner/Partner, General Mgr.
12. Vice President, Asst. VP
13. Treasurer, Controller, Financial Officer

DEPARTMENTAL MANAGEMENT
51. Sales & Mktg. Management
70. Medical, Legal, Accounting Mgt.

OTHER PROFESSIONAL MANAGEMENT
80. Educator, Journalist, Librarians, Students
90. Other Titled Personnel

3. Are you involved in the purchase or use of the following: (Circle all that apply.)
a. Networking/Communication Equipment
b. PCs/Workstations
c. Large Scale/Midrange Systems
d. Software
e. Peripherals

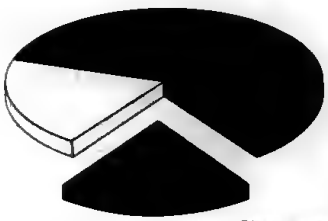
E4324-1

COMPUTERWORLD

Take a slice off the price of Computerworld.

51 issues for only ~~$96~~. *Now only $42.95*

❑ Save me a slice. I accept your offer of $42.95* for 51 issues, a savings of over $5.00 off the basic subscription price of $48.



First Name MI Last Name

Title Company

Address

City State Zip

Address Shown ❑ Home ❑ Business ❑ New ❑ Renew Basic rate: $48 per year

* U.S. Only. Canada $74.97, Central/South America $130, Europe $195, all other countries $295
Foreign orders must be pre-paid in U.S. dollars.

Please answer the questions below in order to qualify for this offer.

1. BUSINESS/INDUSTRY (Circle one)
10. Manufacturer (other than computer)
20. Finance/Insurance/Real Estate
30. Medical/Law/Education
40. Wholesale/Retail/Trade
50. Business Service (except DP)
60. Government - State/Federal/Local
65. Communications Systems/Public Utilities/ Transportation
70. Mining/Construction/Petroleum/Refining/Agric.
80. Manufacturer of Computers Computer-Related Systems or Peripherals
85. Systems Integrators, VARs, Computer Service Bureaus, Software Planning & Consulting Services
90. Computer/Peripheral Dealer/Dist./ Retailer
95. Other_____
(Please Specify)

2. TITLE/FUNCTION (Circle one)
IS/MIS/DP MANAGEMENT
19. Chief Information Officer/Vice President/ Asst. VP IS/MIS/DP Management
21. Dir./Mgr. MIS Services, Information Center
22. Dir./Mgr. Tech. Planning, Adm. Svcs., Data Comm. Network Sys. Mgt., LAN Mgr., PC Mgr.
23. Dir./Mgr. Sys. Development, Sys. Architecture
31. Programming Management, Software Developers
41. Engineering, Scientific, R&D, Tech. Mgt.
90. Sys. Integrators/VARs/Consulting Mgt.

CORPORATE MANAGEMENT
11. President, Owner/Partner, General Mgr.
12. Vice President, Asst. VP
13. Treasurer, Controller, Financial Officer

DEPARTMENTAL MANAGEMENT
51. Sales & Mktg. Management
70. Medical, Legal, Accounting Mgt.

OTHER PROFESSIONAL MANAGEMENT
80. Educator, Journalists, Librarians, Students
90. Other Titled Personnel

3. Are you involved in the purchase or use of the following: (Circle all that apply.)
a. Networking/Communication Equipment
b. PCs/Workstations
c. Large Scale/Midrange Systems
d. Software
e. Peripherals

E4324-1

COMPUTERWORLD

NO POSTAGE
NECESSARY
IF MAILED
IN THE UNITED
STATES

BUSINESS REPLY MAIL
FIRST CLASS MAIL PERMIT NO. 55 MARION, OH 43306

POSTAGE WILL BE PAID BY ADDRESSEE

COMPUTERWORLD

PO BOX 2044
MARION OHIO 43306-2144

NO POSTAGE
NECESSARY
IF MAILED
IN THE UNITED
STATES

BUSINESS REPLY MAIL
FIRST CLASS MAIL PERMIT NO. 55 MARION, OH 43306

POSTAGE WILL BE PAID BY ADDRESSEE

COMPUTERWORLD

P.O. BOX 2044
MARION, OHIO 43306-2144

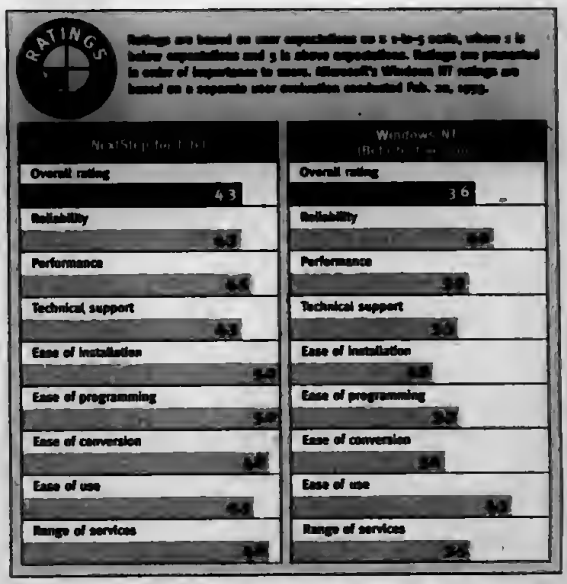
NextStep 3.1 for Intel: Users say it sizzles on 486 machines and is the best OOP platform

Computerworld's Firing Line is an evaluation based on interviews with major users at corporate and educational installations. The product under evaluation is being used in live application environments.

Next, Inc.'s NextStep for Intel

■ Evaluators said Next, Inc.'s NextStep for Intel is a robust implementation of the operating system and development environment. They were surprised that performance on the Intel platform exceeded that of Next's proprietary hardware.

■ The relative shortfall of commercial applications for NextStep is of continuing concern. But the evaluators claimed the NextStep development environment outweighs this issue.



It was more than three years ago that Apple Computer, Inc. cofounder Steve Jobs started his second Silicon Valley venture.

But the company, Next, in Redwood City, Calif., has not approached the raging success of Apple. After burning through an estimated $200 million in venture capital, the company's proprietary-hardware and operating environment had achieved little more than niche status at most user sites.

That may have changed last month. With a blizzard of announcements, Next said it has abandoned its proprietary hardware to become a software-only company.

The first fruit of that realignment is NextStep 3.1 for Intel, a version of the Unix operating system and NextStep designed to run on Intel Corp.'s f486 and Pentium processors. Like its predecessor, NextStep for Intel includes the multithreaded, multitasking Mach operating system kernel and (in the developer version of the environment) a variety of object-oriented programming tools, such as the NextStep Interface Builder, for rapid application development.

SITE PROFILES

	[illegible]	[illegible]	[illegible]	[illegible]
Using beta-test version since	November 1992	November 1992	December 1992	December 1992
Hardware platforms	Dell DGX, Epson Progress, HP Vectra	Compaq, Goldstar	DEC, Intel, Compaq, Dell	Compaq, Dell
Number of NextStep programmers	6	2	60	40
Intend to deploy	Now	Now	Now	Sometime in 1993

The evaluators participating in this survey were all beta-test users of NextStep for Intel. They also used NextStep on Next's proprietary hardware, some since the Next "Cube" first became available in 1990.

Despite their enthusiasm for NextStep for Intel, the evaluators were concerned about Next's longevity. They cited the relative shortage of commercial applications for NextStep — an estimated 600 vs. more than 50,000 for Microsoft Corp.'s Windows environment. They were also concerned that Next would be unable to make NextStep a commercially viable alternative to upcoming operating systems from Microsoft and other vendors.

Reliability

Based on a variant of the Unix operating system called Mach, NextStep is a stable and reliable platform, the evaluators said.

The telecommunications firm, which is developing customer service applications demanding high-speed transaction processing, experienced some programming difficulties. The evaluators also said NextStep provides a file recovery mechanism at least equal in capability to other Unix implementations.

Telecom firm: "I've never experienced a failure on NextStep, mostly because it's a Unix operating system."

Integrator: "We're doing things with NextStep that it doesn't normally support by extending the development environment."

Performance

If nothing else, NextStep for Intel revealed the performance deficiencies of Next's now-defunct hardware. Using a variety of name-brand and clone PCs, the evaluators said NextStep ran considerably faster on the 486 machines than on the NextStation. None of the evaluators had yet tested NextStep on Intel's Pentium processor.

Developer: "I was shocked to see how fast it ran, especially on cheap hardware."

Telecom firm: "We gave it a rigorous performance evaluation. . . . We got a 67% performance increase compared to the NextStation."

Technical support

Next's technical support was diffi-

Users, *page 122*

Users were concerned about Next's longevity but gave NextStep for Intel high ratings

CONTINUED FROM PAGE 121

cult to measure, given that the evaluators had very little need to contact the company. In the few cases where technical support was required, the evaluators were dealing with arcane programming issues that had yet to be resolved in the beta-test version of the operating system.

Documentation was viewed by the evaluators as merely "adequate."

Ease of installation

Information systems managers and users know that operating system upgrades and installations can be arduous. Many companies, such as Microsoft with Windows NT and IBM with OS/2 2.1, have now begun to deliver their operating systems on CD-ROM, a method pioneered by Next more than three years ago.

Once the physical installation has been completed, NextStep includes a wealth of utilities for networking and hardware configuration that vastly reduce installation time. Utilities to connect to Novell, Inc.'s NetWare and Apple's Appleshare can be operated by novice users, evaluators said.

Developer: "I was surprised at how seamlessly everything came together."

Telecom firm: "It's plug and play. You load it and it goes."

Integrator: "We were able to turn out a new [NextStep-ready] system in an hour."

Ease of programming

Despite fourth-generation languages, end-user programming tools and the object-oriented revolution, NextStep still holds sway with these evaluators.

With a wealth of programming tools, browsers and an integrated development environment, NextStep has always garnered rave reviews from developers.

The evaluators said the same of NextStep for Intel. They unanimously agreed that the object-oriented NextStep development environment reduced programming efforts by anywhere from three to 100 times those of other platforms and languages.

NextStep for Intel features

- Runs on Intel i486 or Pentium platforms with a minimum of 8M bytes of RAM and a 120M-byte hard disk.
- Available in $795 user version or $1,995 developer version.
- Supports Ethernet and Token Ring network adapters; PostScript printers; Microsoft and Logitech mice; and VGA video as 2-bit gray scale.

Developer: "NextStep is giving us a 100-to-1 magnification over conventional programming environments."

Telecom firm: It is "the best environment known to mankind for object-oriented software development. It's not worth talking about because no one will believe you."

Ease of conversion

The evaluators had all ported applications from NextStep 3.0 (for Next's proprietary hardware) to NextStep for Intel. All agreed that the porting effort requires no more work than a simple recompilation.

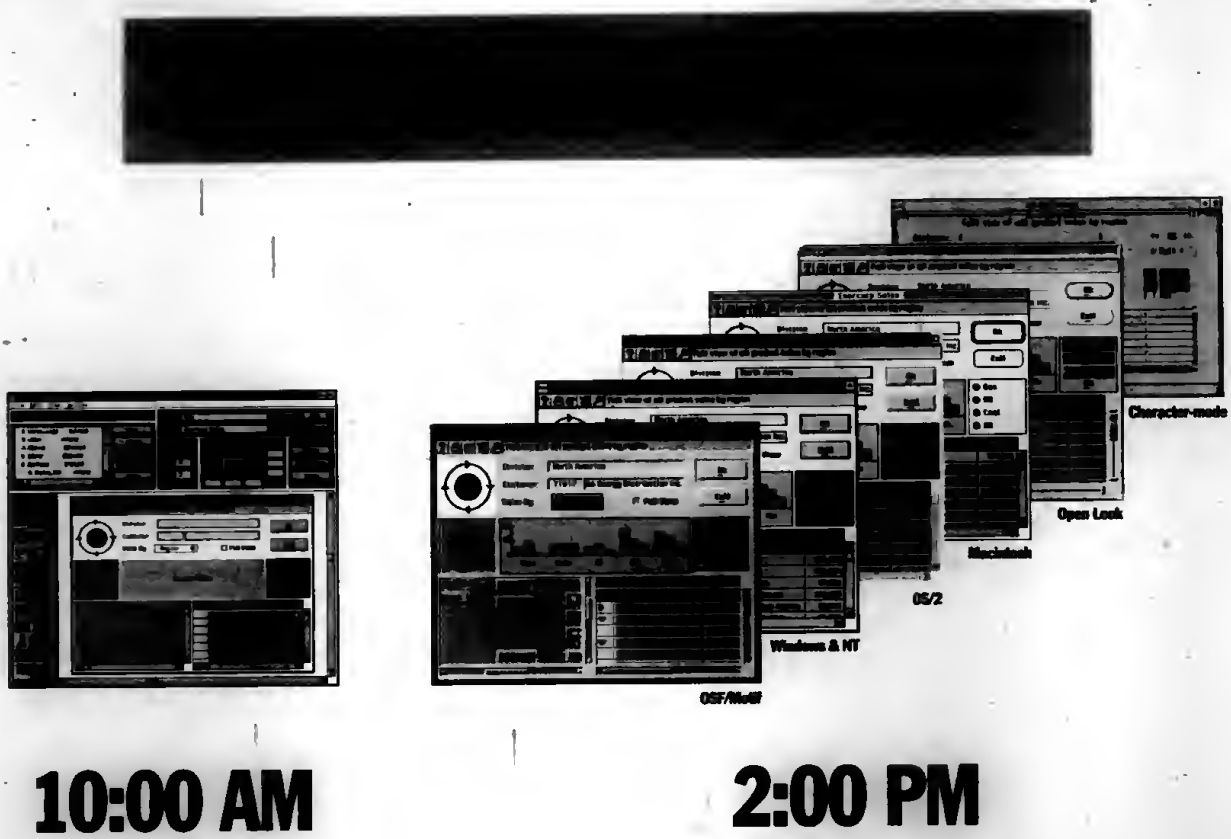
The developer said he lengthened his porting effort by making unnecessary changes to his application code. When he ported the code a second time without changing any code, the conversion to NextStep for Intel went flawlessly, he said.

Developer: "It was better than [Next] told me it would be. It was a dream."

Integrator: "It was fun to watch developers saying, 'I don't believe it. I [ported an application] in two hours.'"

Ease of use

The evaluators generally compared the NextStep user interface to the Apple Macintosh, and they agreed that the Macintosh has a slight edge in usability. They



also said operations such as transferring data among NextStep applications were far easier than in Macintosh or Windows applications.

Developer: "Compared to the Macintosh, there are some things that I miss."

Telecom firm: "For end users, it's on par with the Apple Macintosh."

Integrator: "I've put it on the desks of executives who refuse to touch a DOS or Macintosh system."

Range of services

From a developer perspective, the evaluators said NextStep for Intel has no peer.

Starting with the complement of development tools such as Interface Builder and extending to the enhanced and simplified Unix utility programs, NextStep has few rivals as an operating environment, the evaluators said.

Developer: "Everything a person could think of is in Unix, and Next has packaged those [Unix] commands into good user interface objects."

Written and compiled by research manager Michael L. Sullivan-Trainor.

Next responds

The following are Next's responses to issues raised in this evaluation.

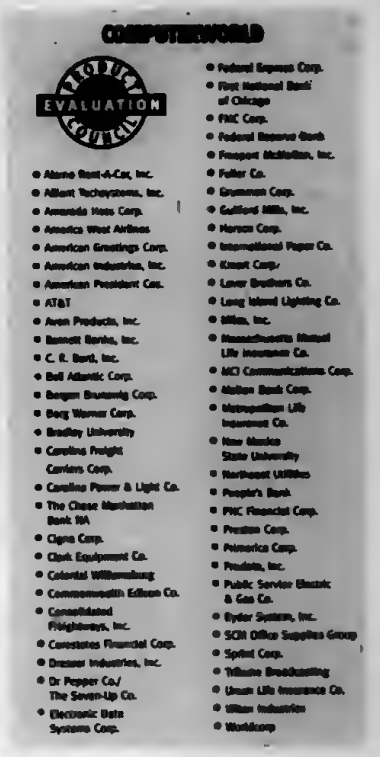
•**Availability of commercial software:** Next has more productivity and business applications to serve its customers than any other Unix or workstation vendor. With SoftPC from Insignia Solutions, Inc., NextStep will support DOS and Windows applications, providing our customers with access to that application base. NextStep for Intel will significantly expand the market for commercial software developers, resulting in many new NextStep applications during the next few months.

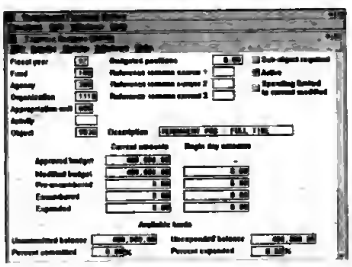
•**NextStep and industry standards:** Next was the first Unix vendor to integrate NetWare client software. We have announced that we will support the Open Software Foundation's (OSF) Distributed Management Environment, the Object Management Group's Common Object Request Broker Architecture and the OSF's Distributed Computing Environment standards. Our philosophy is to work with customers and strategic partners to adopt and seamlessly integrate industry standards that promote interoperability.

•**Challenges:** The greatest challenge is getting the word out about NextStep as broadly as possible and letting customers know how many customers are re-engineering and automating business processes using NextStep. A first step is having developers experience the benefits of NextStep. We are offering that through our $299 evaluation kit.

•**Viability in enterprise computing:** Our primary market is the corporate desktop. We offer a combination of strengths that no other operating system vendor has, including the ability to build client/server applications five to 10 times faster than traditional methods; the ability to deploy extremely robust, enterprisewide applications; and the ability to make enterprise computing as easy for the user as stand-alone computing is today.

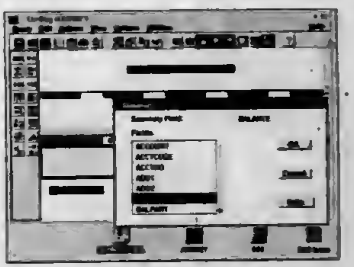
•**Third-party tools:** NextStep is open to support tools and languages from third parties. We currently have third-party support for Fortran, Cobol, Smalltalk, LISP and a variety of fourth-generation languages.





*For **American Management Systems** (AMS), Open Interface enabled the simultaneous deployment of a client/server application on five platforms..*

***Computron**, using Open Interface, ported their GUI for financial and workflow applications to customers' platforms in just hours.*



***Sterling Software** created a Query and Reporting tool with mainframe access by utilizing Open Interface's unique combination of power and portability.*

Presenting Open Interface: the cross-platform GUI framework.

Here's the claim, plain and simple: with Neuron Data Open Interface, you can develop GUI applications for client/server or commercial software on any platform—and then instantly port to any standard windowing environment on over 25 platforms, including IBM, Apple, DEC, HP, Sun, and PC UNIX.

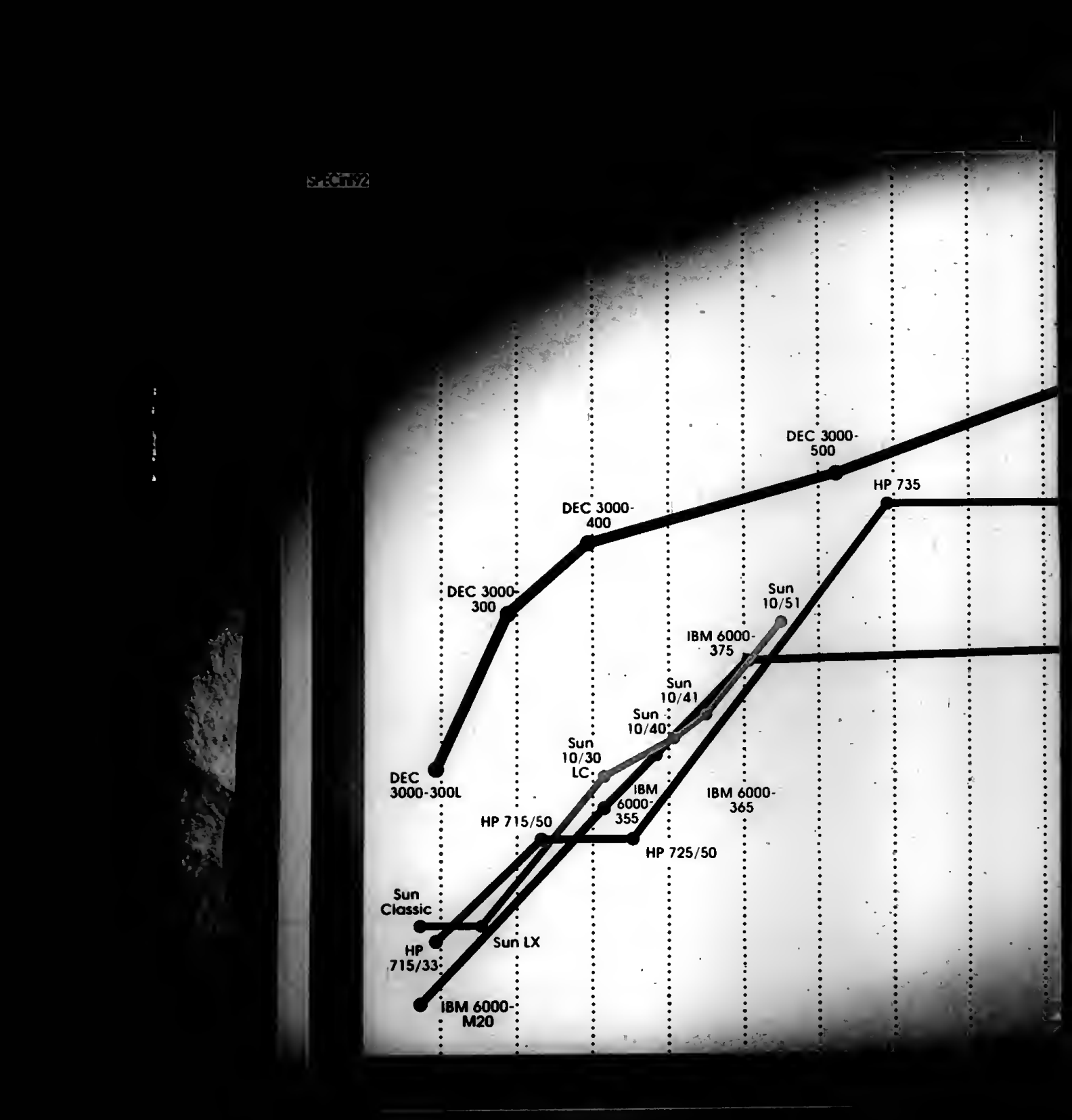
The proof? Software developers and system integrators like AMS, Cadam, Andersen Consulting, EDS, ESRI, IBM, Lockheed, Moody's, Nasdaq and Tandem, all of whom are using Open Interface to realize extraordinary productivity benefits. These benefits come from having a higher level of extensible functionality—including a script language and database access—built right into Open Interface. And, they won't sacrifice your ability to port to other environments. They're benefits that enable these companies, and scores like them, to get their products to market quickly, and expand onto new platforms and into new markets.

Want more proof? Give us a call at 800-876-4900, ext. 661, and we'll send you seminar information, product literature, and a free comprehensive technical paper. Special VAR, OEM, and ISV pricing available.

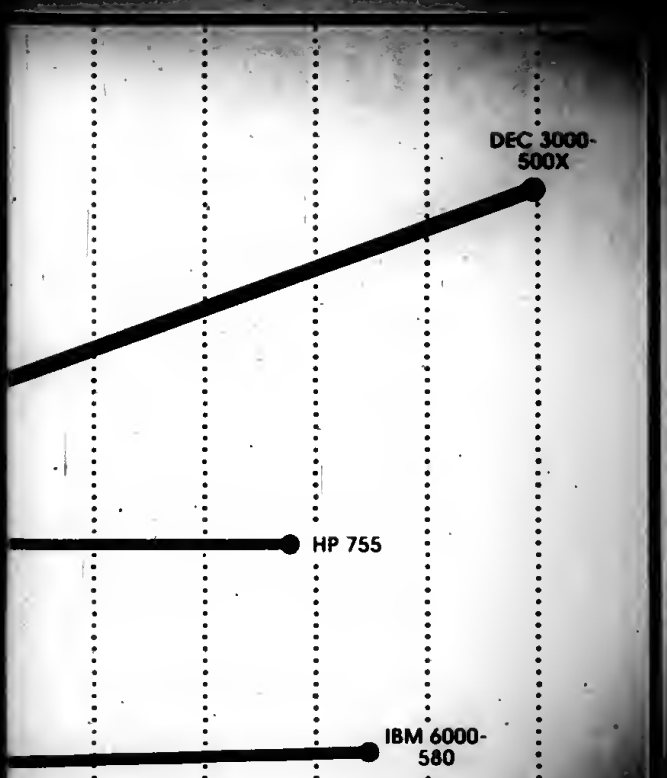
Open Interface. There's nothing ordinary about it.

ND NEURON DATA

Neuron Data Open Interface is a trademark of Neuron Data, Inc. All other copyrights are the trademarks of their respective owners. © 1993 Neuron Data, Inc.



imagine working faster than you ever imagined.



digital

How to pass the bar exam.

Scan this bar code with your eye. Notice how clearly defined its characters are. A scanner will find no trouble in this bar.

An impressive lineup. Our toners perform in extreme temperatures. Nice to know when your printer's on-line for hours on end.

Perfect consistency of blackness from beginning to end is typical of IBM toners by Lexmark.

Our high-quality toners virtually eliminate "bridging" between scan lines.

These days, there's a code we all must live by. The bar code. And as common as the bar code is, it is the very devil to render properly. One tiny error, and a spool of thread becomes an entire suit.

Lexmark strives to surpass the precision that is expected of our IBM® toners. The IBM toners that many industries rely upon for crisp bar codes can make your printing look sharp, too. Insist on original IBM toners by Lexmark. You'll be using the best, bar none.

To locate the dealer nearest you, to order, or to receive your free catalog, call 1-800-438-2468, ext. 50. (In Canada, call 1-800-663-7662.)

Lexmark International, a former subsidiary of IBM, is an independent, worldwide company that develops, manufactures, and markets IBM personal printers, IBM typewriters, related supplies and keyboards.

IBM Supplies by

LEXMARK™

Make Your Mark

IBM is a registered trademark of International Business Machines Corporation in the United States and/or other countries and is used under license. Lexmark is a trademark of Lexmark International, Inc. ©1995 Lexmark International, Inc.

IBM SUPPLIES BY LEXMARK. TAKE A CLOSER LOOK.

Objection!

There is no truth in claims that object DBMSs are superior to relational DBMSs. In fact, object DBMSs are much like the hierarchical network databases of old — inflexible and in need of manual methods to maximize application performance.

By Fabian Pascal

OBJECT MANIA HAS taken over the industry, and proponents of object orientation are heralding object databases and object database management systems as a cure for the purported weaknesses of relational technology.

Poppycock.

We're told that the relational data structure — the table — is too simplistic to represent the complexity of real-world information. Object database technology, on the other hand, is praised as a more "realistic" database option because it can handle unstructured information, such as graphics, binary code and compound documents — information that database designers can't readily capture in tables.

This argument is specious. Object DBMSs do not deal with unstructured data any better than any other DBMS (which is to say, not well).

The concepts underlying object orientation are useful at the front-end (application) level, and that's where software designers should focus their efforts. Here these concepts act as well-known principles of good software development. Applying object orientation directly and indiscriminately at the database level reintroduces problems that have haunted the database practice for years and that took the relational approach two decades to get rid of. Database technology is, in fact, regressing.

Practically all claims that object DBMSs are superior to RDBMSs are flawed, as I'd like to prove with the following:

Claim

Object DBMSs offer more realistic representations of the world because they don't have to be relational tables but can be "anything"; particularly, they can represent nnstructured data.

Reality

RDBMSs can accommodate unstructured data as well as object DBMSs can.

Background

RDBMSs do have a mechanism for dealing with unstructured data — basic large objects (Blob). Blobs contain unstructured data and can be associated with structured data. Blobs can be defined over domains, which are equivalent to user-defined data types in programming languages and akin to object types in object-oriented terminology. Had SQL RDBMSs supported relational domains, Blobs could have inherited the user-defined operations from the domains, achieving the same objective as object DBMSs.

Claim

RDBMSs complicate the handling of certain kinds of information in areas such as scientific experiments, financial portfolio management and trading, insurance policy maintenance.

Objection! *page 128*

FIRE & ICE

Users like the idea of object DBMSs . . . but aren't sold on today's technology

Total respondents: 161 object-oriented tool users

Source: Buyers' Scorecard survey

Pascal is a Palo Alto, Calif., independent consultant, teacher and writer specializing in database management. His forthcoming book, *Understanding Relational Databases* (John Wiley and Sons), will contain a detailed treatment of the arguments in this piece.

For our report on object oriented programming, see page 107

Objection!

CONTINUED FROM PAGE 127

manufacturing and computer-aided software engineering, as well as computer-aided design, manufacturing and engineering. The data in applications such as these works well in a tabular format, but the relational database design principles (known as normalization) generate lots of deep or sparse tables involving operations such as multitable joins — and do not represent hierarchies or multidimensionality well. This complicates access and adversely affects DBMS performance.

Reality

These complexity problems stem from SQL and its commercial implementations, not relational technology per se. Although SQL has, unfortunately, become synonymous with relational technology, almost all SQL products violate, ignore or poorly implement many relational features. Basing RDBMSs on a better SQL standard (or better relational language altogether) would eliminate most difficulties and would be a better solution than object DBMSs.

Background

In the absence of a general, well-defined, theory-based data model equivalent to the relational model, object DBMSs borrow data structures from programming languages (such as C++ or Smalltalk). These structures are language-specific, do not have the useful properties of relational tables and complicate data manipulation without adding power. Therefore, they suffer from some of the same problems the prerelational world had.

Relational databases, on the other hand, can and do represent more complex structures without those problems. Containment hierarchies, for example, are represented relationally by means of explicit values in tables, a much simpler and more flexible approach than physically hard-wiring them into the database with pointers, as object DBMSs and hierarchical databases do.

What is really needed is a set of data

Objection! *page 130*

MICROSOFT AND BORLAND STAND BEHIND SMALLTALK/V.

If you're looking for the fastest, easiest way to develop and maintain applications, see Computerworld. That's where the major object-oriented languages were meticulously rated by actual customers.

For reusability of code and ease of maintenance, no product rated higher.

The under $500 Smalltalk/V® outranked its $3500 rival from ParcPlace Systems, and neatly outscored C++ from Microsoft and Borland.

With ratings like these, it's no wonder a company like IBM really does stand behind us.

IBM TAKES A STAND

Because of the leading edge technology and superior quality of Smalltalk/V, Digitalk is now one of only eight companies appointed to IBM's International Alliance for AD/Cycle. Which means Digitalk's Smalltalk/V is a key part of IBM's strategy for the 1990's.

It's not surprising, when you consider that our top-rated reusability of code is the essence of object-oriented programming. And that our unequaled ease of maintenance is the feature considered most important by users in the Computerworld survey.

DEVELOP FASTER

Numerous case histories have shown that you can develop at least twice as fast with Smalltalk/V than with C++. Smalltalk/V is available for OS/2, as well as Windows, Macintosh and DOS. With easy portability across each platform. And every application you deliver is 100% royalty-free.

To receive an informative white paper on Smalltalk/V object-oriented technology, call 1-800-531-2344. Please ask for Department 502.

If you're looking for the fastest way to develop applications, get behind the winning technology for the 1990's.

INTERNATIONAL ALLIANCE IBM AD/Cycle

100% PURE OBJECTS. DIGITALK

Prenuptial advice

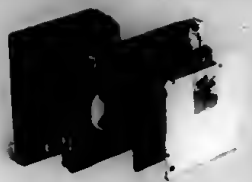
Without a fully effective relational technology and with object orientation not the miracle cure, what can IS managers expect?

The idea of the two DBMS approaches converging is one possibility. If RDBMSs become more object-oriented and object-oriented DBMSs incorporate more relational features, the need to choose between the two technologies may become moot. The following is what is supposed to happen, according to the Committee for Advanced DBMS Function at the University of California at Berkeley:

- Besides traditional data management services, third-generation DBMSs will provide support for richer object structures and rules.
- Third-generation DBMSs will incorporate second-generation DBMSs.
- Third-generation DBMSs must be open to other subsystems.

Whether or not such a merger becomes real, my advice to users is to represent in relational tables as much data as they can and have an RDBMS manage that data. They should do so even if they can store unstructured data in the same database. For example, extracting data from contracts into tables and storing both the tables and the contracts as a text or graphic image in Blobs is more useful than storing the contracts by themselves. That's because the relational database structure and DBMS features give users more intelligent manipulation and DBMS control.

As to the specific RDBMSs to use, users should opt for one based on the correct combination of relational DBMS facilities and object-oriented tools and applications. Unless users make it known they want such combinations, good DBMSs will become increasingly hard to find. — *Fabian Pascal*



However big your storage needs grow, you'll find proven solutions with 3M data storage products. Take our new 3M 21 megabyte* Floptical™ diskettes. They may look like standard 3.5-inch diskettes, but they'll give you over 14 times the capacity at a low system and media cost.

For even higher capacity in a compact size, 3M 3.5-inch Rewritable Optical Disks give you quick random and direct access to data. Plus the ability to erase and rewrite.

If you need multi-gigabyte capacity, consider 3M 1/4-inch data cartridges. They offer fast transfer rates up to 48 megabytes per minute and access times faster than 32 seconds. From our mini 1/4-inch data cartridge to 3M Magnus™ 2.1 gigabyte data cartridges, you'll get durable, reliable performance. And even higher capacities with data compression.

Another multi-gigabyte option is the 3M ECart.™ Co-developed with IBM, the ECart is a 1/2-inch tape cartridge for 3490E drives that delivers the same proven reliability you've come to expect from 3M 3480 cartridges—with up to 12 times the capacity.

With proven storage solutions in so many different capacities, it's no wonder more businesses protect important information on 3M brand data storage products than any other brand in the world.

For more information call 1-800-888-1889, ext. 51.

Plug into proven storage solutions.

In any capacity you need.

Reliability

What IS really needs for database management is as follows:

- **WE NEED products that better adhere to the relational model. We have to correct SQL's deficiencies and extend the language to support, among other things, true domains, nested relations, additional relational operations, stored procedures, Blobs and user-defined functions. Otherwise, we need a better relational data language.**
- **WE NEED extensions to the relational model.**
- **WE NEED physical implementation improvements and better exploitation of hardware advances.**

Objection!

CONTINUED FROM PAGE 128

operations that exploit these values. C. J. Date and E. F. Codd proposed using hierarchy explosion operations, which are useful for bill-of-material and organizational chart applications.

The reason RDBMS products are cumbersome for queries such as "What are the top X rows?" is the failure of SQL to support a relational partition operation — splitting one table in two.

There are also promising avenues no one has pursued for extending the relational model. Nested relations, for instance, enable relational tables to be values in other tables, which can improve the representation of more complex relationships without losing the theoretical properties of the relational structure.

Claim

Object-oriented encapsulation provides greater data independence because it releases users from having to know the structure, methods and integrity constraints applicable to objects.

Reality

Object-oriented encapsulation can actually result in loss of data independence. Without theoretical guidelines such as normalization, object database design is arbitrary, complex and inflexible.

Background

Because objects can inherit properties and behavior from other object types, changes in one object type can have database-wide repercussions and put maintenance burdens on database administrators and application developers.

Moreover, when a relationship exists between objects of different types, who knows in which object class developers should encapsulate the relationship? The same question comes up for methods that manipulate multiple objects.

Object database encapsulation is supposed to capture more meaning within the database and simplify matters for users, but it actually causes complications. For example, it requires database designers to encapsulate data relationships, integrity constraints and manipulation in object classes at the database design stage. However, it is impossible to know at database design time all the data relationships and manipulation needs of current and future applications.

The fact that object DBMS vendors are now scrambling to add ad hoc querying facilities to their products — in effect, a violation of object-orientation principles — is telling.

Application developers can avoid some of these problems in relational environments by using stored procedures with the DBMS security mechanism for encapsulation.

Claim

Object DBMSs offer simpler database access than RDBMSs because navigation eliminates complex and slow operations such as multitable joins. Navigation also does away with the impedance mismatch between set-oriented relational database processing and record-oriented programming languages. (For example, SQL embedded in programming languages and the use of cumbersome cursors.)

There is no longer a need (as with SQL) for separate languages for database access and application development; there is only one computationally complete language.

Reality

With pointer-based structures, object databases end up like the old hierarchical and network databases: biased toward certain applications and against others. They are also inflexible. For example, when data relationships or the patterns of access to data change, it affects many object types, which developers must modify or reoptimize.

Chasing pointers across networks is not conducive to data distribution, either.

Object DBMS native languages are navigational and procedural; that is, they are third-generation languages. The impedance mismatch is "resolved" by lowering the DBMS to the record level. This is the opposite of what the solution ought to be: making languages more powerful by raising them to the set level.

Claim

Object DBMSs provide higher performance than RDBMSs. Pointer navigation is faster than multitable operations (particularly joins) and does not require relational performance optimization.

Reality

Without the benefit of relational theory, there is no such thing as system optimization in object DBMSs. Developers have to use manual methods to maximize and reoptimize applications performance.

Background

DBMS designers enhance object DBMS performance by caching complex object structures in application memory, guaranteeing no more than one I/O per object instance, using optimistic concurrency mechanisms (such as versioning) and exploiting certain hardware or operating system capabilities.

But these are physical tuning strategies that have absolutely nothing to do with the object orientation of object DBMSs. Not only are they possible with any RDBMS, but using an RDBMS puts less of a burden on users because of relational data independence.

Sticking closer to the relational model and improving physical implementation capabilities are more effective ways to improve performance and are better for users than object technology. ■

C. J. Date

A fruitful union

Where is database technology headed? Some pundits have predicted the imminent demise of relational databases. They claim today's relational systems are just too simplistic for the complex databases we need in the 1990s and have jumped with both feet onto the object-oriented bandwagon.

"The world is much too complex to be represented in flat relational tables" is a typical claim heard from this camp. On the other hand, relational advocates have been defending their position stoutly, arguing the importance of relational's solid theoretical foundation and pointing out that in certain respects, object-oriented technology represents a giant step backward.

Well, I have some good news: We can have our cake and eat it, too! The point is to marry the two technologies instead of throwing mud at each other.

When I talk of marrying the technologies, I mean we should try to extend relational systems to incorporate the good features of object orientation and shun the bad. Let me stress that I am talking about a marriage of technologies, not of products. I am not pretending a clean integration between object-oriented product X and relational product Y is a simple matter — or even achievable or a good thing.

So how are we to meet this desirable goal? By looking for what the two have in common.

The fundamental construct in object-oriented systems is the object class, which is (in general) a user-defined, encapsulated data type of arbitrary internal complexity. (Note: I use the term data type here in the sense in which the term is understood in modern programming languages. In particular, it means only certain operators, whose definitions are provided by the users, can manipulate instances of the data type in question. I am not referring just to primitive, system-defined, built-in data types such as Integer and Char.)

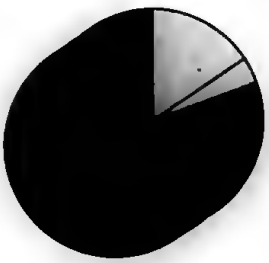
In relational systems, the fundamental construct is the domain, which for the most part is not implemented in today's relational products. In general, a domain is a user-defined, encapsulated data type of arbitrary internal complexity — i.e., a domain and an object class are the same.

In my opinion, therefore, domains are the key to achieving our "desirable goal." A relational system that implements domains properly would be able to do all the things that object-oriented advocates claim object-oriented systems can do and relational systems cannot. Thus, criticisms of relational from object-oriented advocates may well be accurate if they are taken as criticisms of today's products; however, they are not accurate if they are taken as criticisms of the potential of the technology.

Relational vendors should do everything in their power to extend their systems to include proper domain support. Indeed, you can make an argument that the whole reason we are getting into this debate on the relative merits of object-oriented and relational is precisely because the relational vendors have failed so far to support the relational model adequately. But this fact shouldn't be an argument for abandoning relational entirely. It would be a great shame to walk away from the experience gained from more than 20 years of solid relational research and development.

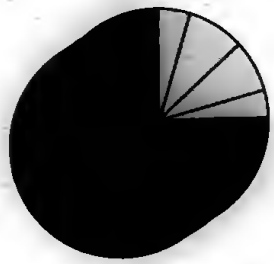
Date is an independent author, lecturer and consultant specializing in relational database systems. He is author of the book *An Introduction to Database Systems: Volume I*.

Why is Compuware the company so many turn to for programming productivity tools?



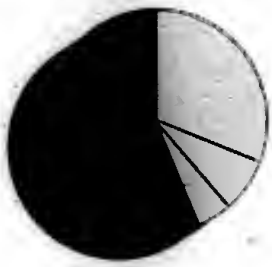
Fault Diagnosis Tool Purchases

80%* choose
Abend-AID®
over all other products



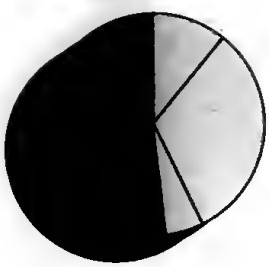
File & Data Management Tool Purchases

76%* choose
File-AID®
over all other products



Automated Testing Tool Purchases

55%* choose
PLAYBACK™
over all other products



Interactive Debugging Tool Purchases

52%* choose
XPEDITER®
over all other products

When development projects pile up, IS professionals insist on Compuware.

For many IS organizations, it is both impractical and impossible to increase staff to accommodate workload increases in development and maintenance. You're caught in a squeeze. The only way out is to improve productivity—fast. At Compuware, we specialize in maximizing the productivity of your most valuable resource—your programming staff. That's why over 5,700 companies have turned to Compuware.

Quality-built applications—first time, every time.

The time crunch in testing leaves programmers choosing between getting things done and getting things done right. The trick is to do both. That's why, for building quality applications, more companies put their trust in Compuware testing, debugging, and maintenance tools.

Adaptability to an ever-changing IS industry.

As platforms and environments evolve, your programmers expect their support tools to adapt, whether it's DB2, IMS, CICS, or today's client/server applications. Compuware tools do.

In 20 years, our commitment to programming productivity hasn't wavered, regardless of what direction the industry has followed.

It's what you'd expect from the programming productivity experts.

For a free brochure telling you why IS professionals choose Compuware, call 1-800-535-8707 or 313 -737-7300

COMPUWARE®
Sophisticated Software Used Every Day

*Percentages reflect comparisons to products with similar features. Compuware, Abend-AID, File-AID, XPEDITER and PLAYBACK are trademarks or registered trademarks of Compuware Corporation. DB2 is a registered trademark of International Business Machines Corporation.

HOT SPOTS for PROGRAMMERS

By David Baum

[redacted] to INDUSTRY EXPERTS agree that a handful of emerging technologies will make or break programming careers in the years ahead. While areas such as event-driven programming and object-oriented development may sound like old news to some, experts say the average programmer lacks the necessary know-how in these areas.

Even less common on a programmer's skill list is the ability to create visual representations of functionality — not a crucial skill but one that separates leading programmers from the crowd.

If you haven't added these skills yet, all is not lost. Experts recommend that you learn the following to keep in step with the industry:

•Event-driven programming

Mainframe programmers must make two primary shifts to move to client/server. The first is understanding the differences between character-based programming and event-driven or graphical user interface (GUI) programming. The second is the shift from information systems-driven systems development, involving rigorous analysis and design, to the more spontaneous, user-driven, rapid prototyping of PC systems.

Programming for a GUI environment is more complex than programming for character-based applications. It's not s simple extension of Cobol or Fortran programming; it is event-driven. The user cootrols the events, not the programmer.

"It's easy to slap up a GUI screen, to prototype a window with some basic programming behind it," says Kent Failing, president of Computer Design Professionals, a consulting firm in Atlanta. "But event-driven means the user can jump anywhere on that screen and access a feature or combination of features that you hadn't anticipated." Failing adds, "You must be very good at testing and debugging and be rigorous about not leaving any places where the user can leave data hanging or only partially update a record."

To build systems, programmers should also become comfortable with rapid prototyping and constant user interaction. "If client/server is going to be done by the MIS group, they need to become familiar with a rapid, more iterative approach to systems development," Failing says. At the enterprise level, applications require code that is oriented to both the client and the server, with more emphasis on the server. This makes skills in relational databases extremely important.

"Nearly every job that comes down for development in a client/server environment requires expertise in either Oracle or Sybase. in my experience, managers would rather take someone who has the database skills and train them in the client/server development tools than the other way around," Failing says.

•Object-oriented development

Hand in hand with the industry's grand waltz to client/server is its embrace of object-oriented technology. But how do traditional programmers get their feet wet?

"Object orientation involves a whole new learning curve," says Nathan Lane, a developer at Trico Title Co. in Santa Barbara, Calif. "An application isn't one monolithic block of code; it's hundreds of discrete objects." Rather than a simple disptay screen of 80 by 120 characters, an object-oriented application works with pixels. Groups of pixels become objects that perform predefined operations.

How do you become accustomed to this type of programming? Dive in and try it, suggests Victor Janulaitis of Positive Support Review, a recruiting firm in Santa Monica, Calif. "Get hold of an inexpensive tool such as Microsoft Corp.'s Visual Basic or Borland International, Inc.'s ObjectVision to see how graphical applications are pulled together."

•Programming with pictures

Graphic arts skills have never been a part of the programmer's curriculum, but the usability of today's applications is becoming dependent on the visual syntax. The need for a visual representation of how the functions make sense has led to a near-universal demand for a new type of developer, says Joe Carter, a partner at Andersen Consulting in Chicago. "We need people who can combine the technical skills of a programmer with the visual taleots of an artist."

There aren't a lot of people who are good at creating visual representations of functionality, Carter says, hut an understanding of typography, visual layout and design sets today's leading-edge programmers apart. "These skills might some day become a standard part of the programmer's job. Those who learn them now will be ahead of the game."

•Peer-to-peer networks

These emerging technologies imply additional changes at the network level. Developing for client/server can involve programming low-level communications code to distribute processing logic among client and server nodes. Therefore, understanding the rudiments of peer-to-peer networking is important for most projects. Keith Therrien, a software architect at Arkwright Insurance in Waltham, Mass., suggests getting familiar with the indnstry standards that pertain to your expertise and learning how application programming interfaces work.

Baum is a free-lance writer based in Santa Barbara, Calif.

COLORADO & CALIFORNIA

"Distinguish Yourself with the Support and Backing of a Premier Multi-Million Dollar Organization."

We are seeking Information Systems Professionals for contract and permanent opportunities in either the scenic splendor of the Rocky Mountains or sunny Southern California. Other positions and locations are also available.

DENVER

- POWERBUILDER
- SQL SERVER/SYBASE
- SQL WINDOWS
- SYBASE
- GUI/WINDOWS
- VISUAL BASIC OR C++
- INFORMIX
- CSP/DB2
- ORACLE 6.0, 7.0
- AS/400, RPG
- SYNON/LANSA
- INFORMIX

Dept. CW1
5445 DTC Parkway
Suite 735
Englewood, CO 80111
Phone: (303) 796-7160
Fax: (303) 796-7166
Member NACCB

- POWERBUILDER
- SQL SERVER
- SQL WINDOWS
- SYBASE
- PEOPLESOFT
- VISUAL BASIC
- DEC VAX, COBOL
- ADMARC, CICS
- ORACLE, DBASE, C, NOVELL
- AS/400, SYNON 2E
- OS/2, C/C++, EDI
- NATURAL 2, CONSTRUCT

LOS ANGELES

Dept. CW2
2041 Rosecrans Ave
Suite 105
El Segundo, CA 90245
Phone (310) 416-9846
Fax: (310) 416-9003
Member NACCB

Computer Consultants

In this ever changing economic climate, contracting seems to define the workforce of the future. If you have 1+ years of experience in the areas of Software Engineering or Information Systems, we would like to meet with you.

SOFTWARE ENGINEERING
- GPS/ADA/C/DESIGN
- MSI GRAPHICS/FREELANCE
- ...RTG DESIGN/CMPK.
- ...ETWORK/DB

INFORMATION SYSTEMS
- SYBASE/PWBLDR/ARCHITECT
- MICROFOCUS/Workbench/MULTIPLE
- IMS/SAS/CLINICAL STATS
- X-WINDOWS/MOTIF/C or C++
- PL-1/DATACOM/CICS
- MS WINDOWS/SDK/C
- ...NATURAL
- ...POWERHOUSE
- ...INTERFACE W/or W/O RDB

National
Tel: 800/676-9559
Fax: 617/935-7041

Boston, MA
Tel: 617/227-1212
Fax: 617/227-6837

Woburn, MA
Tel: 617/938-1910
Fax: 617/935-6760

Chicago, IL
Tel: 312/214-6100
Fax: 312/214-3756

Atlanta, GA
Tel: 404/551-8130
Fax: 404/551-8137

Vienna, VA
Tel: 703/847-3650
Fax: 703/761-7095

NEW BOSTON Systems Inc.

Career advice for the '90s

Off-site contracting not common

Fast Track is a twice-monthly column dedicated to answering questions on career directions. This week's guest adviser is Chuck Muller, a principle at Andersen, Jones & Muller Associates, a Southfield, Mich., executive search firm that specializes in placing computer professionals.

Q. Contracting seems to be all the rage, but I never hear anything about long-distance moonlighting at the programmer/analyst level. Is this common, and how can I find these opportunities?

A. Hiring contractors or outsourcing specific projects is a common method of cost control, but hiring independent contractors to work off-site is not. Usually the exception is when a company is looking for expertise in specialized or hard to find skill sets.

These off-site positions are also generally awarded to employees who have already worked for a company and proven themselves to be valuable commodities.

Your best bet is to get in-depth knowledge of a very specific area — even one that may not be hot right now. For instance, one of the off-site programming positions I'm familiar with involves working with Computer Associates International, Inc.'s IDMS — an older relational database product.

Q. I am a computer training and support specialist with nine years of experience. I'd like to get into a new technology area and am willing to learn almost anything. However, I want to make sure the area I choose is not overrun with experienced applicants. What skills are in short supply right now?

A. One area that has increased in demand but has a shortage of experienced professionals is client/server application development. In the past six months, we have had four requests in this area.

Our clients are typically looking for one to two years of solid coding experience in languages such as C++ and Microsoft Corp.'s Visual Basic. Hiring companies are usually new to client/server and want people capable of training their internal staff as well.

Q. I have a bachelor of science degree in computer science and a teaching certificate. I have been teaching high school computer science for five years but would like to get into the information systems field.

What position can I realistically hope for?

A. If you went directly into the job market right now, you would most likely be faced with two job prospects. One is an entry-level systems development position where you would compete with recent graduates for a limited number of jobs.

A better bet is to leverage your existing teaching and people skills for a training position at a computer support services company. If you get an MBA in finance from a top school, it might help you further, especially if you're interested in a consulting position with one of the big accounting firms.

Keeping up

Do you have questions about learning to work in a multiplatform environment? If you do, send your questions to Jodie Haze by calling (800) 343-6474 ext. 727 or faxing them to (508) 875-8931. Answers to individual questions will be solicited from experts in this area. If we use your question, we'll send you a gift.

How do you learn more about your user's business?

TIPS from the TIMES

■ Be part of their day-to-day jobs. We have systems developers who actually go out on the road with our drivers. This allows them to see what kind of obstacles the drivers run into while performing their jobs.

Dan Taylor, director of systems services
North American Van Lines, Inc., Fort Wayne, Ind.

■ Spend time with them. We assign specific business areas to each IS staff member. For instance, one of our applications people works closely with people in the budget and general-ledger departments, and over time they get to know what people need.

David Deckard, supervisor of technical support
Memphis Light Gas and Water, Memphis

■ We attend user staff meetings. This enables us to improve our sensitivity to their needs, to get a better perspective of their jobs and an appreciation for how they perform their duties. They attend our meetings so they can see how we go about meeting their requirements. It gives them a chance to guide us better.

Jim Stirling, manager of systems programming
Mortgage Guaranty Insurance Corp., Milwaukee

■ Every six months we visit our divisions around the country to meet with users. Many times we find that some users are not using the systems correctly, or they may need to be properly trained on the system.

Tom Hankus, manager of data processing
Tuthill Corp., Hinsdale, Ill.

Compiled by Stefanie McCann, assistant researcher.

SALT LAKE CITY

PRODATA/PRO-STAR is one of the West's fastest growing System Integration/Consulting firms, serving 7 states through 9 regional headquarters. Salt Lake City is one of America's "Most Livable Cities" and most vibrant economies, presenting us with the opportunity – and challenge – of needing even more MIS professionals to service our Fortune 1000 and Government clientele. We Seek:

- SYBASE/POWERBUILDER
- MicroFocus/COBOL
- ADABAS/NATURAL
- T.I. IEF, BAA/BSD
- SYNON

Full time positions, salaried/benefits or hourly. Please contact: PRO-STAR, 5282 S. 320 W. # D-292, Murray, UTAH 84107 801-266-6138; FAX 801-266-0099.

CONSULTANTS
Immediate Interviews

MAINFRAMES: Natural 2 CSP • PL1/CICS • Ada DB2/CICS • DB2/DBA DB2 Brokerage • CICS/SP Systems Internals • AMAPS QUALITY SERVICES Powerbuilder • Sybase/SQR Sybase/DBA • Sybase/Dev Smalltalk/80 • Oracle • C++ Motif • Q.A. PC/LAN • GALAXY X Windows • Sys Integrators Novell • CNE • TCP/IP • Esmtl UNIX/Internals • Informix • Snap SUN Sys Admin • Visual Basic Access • Foxpro • Paradox

Robin Rogers Consulting
12124 Parklawn Dr. Rockville, MD 20852
800-388-5995
212-972-1319
Fax 212-302-4363

RPG PROGRAMMER

The Limited is well known for providing challenges to its Associates and when those challenges are met, opportunities are abundant. If you are the type of Programmer who seeks to turn challenges into opportunities and possess the following qualities, we would like to speak with you:

- **RPGIII Programming Skills**
- **AS/400 Experience**
- **Degree in Computer Science** (Preferable)

Your background in these areas, plus up to 2 years experience working with inventory control, scheduling and EDI Projects will make you a prime candidate for these positions.

We will provide you with a comprehensive benefits package including Medical, Dental and Life Insurance; a Retirement Program and 401(k) Savings Plan if you are the successful candidate.

Please forward your resume and salary requirements to:

THE LIMITED, INC.

Store Planning RPG1, P.O. Box 16000
Three Limited Pky., Columbus, OH 43216

NATO HEADQUARTERS BRUSSELS

requires a

Systems Development Manager (M/F)

to work in the Information Systems Service

Reporting to the Head of Service, he/she will be responsible for the management of the Systems Development Section of approximately 20 civilian and military personnel.

Qualified candidates will have:

- a minimum of 8 years experience of managing the development and implementation of management information systems, preferably in a multi-national environment;
- practical experience with modern information systems technologies such as Rapid Development techniques, CASE tools and RDBMS (preferably ORACLE);
- fluent in one of the official NATO languages (English/French) and a good working knowledge of the other;
- national of a NATO country.

Three year renewable contract, an attractive salary package and excellent working conditions.

Applications with detailed curriculum vitae should be sent to:
Recruitment Officer
NATO Headquarters
1110 BRUSSELS
Belgium
Date Limit: 16th July 1993
Only qualified candidates will receive a reply.

Our Clients Consult With the Best...

...GILCOR ENTERPRISES, INC. and you! Headquartered in Chicago, we are a nationwide consulting firm with upcoming projects in the Midwest and Atlanta areas. We are looking for Technical Consultants on a per project basis. Qualified candidates will have senior level experience in one or more of the following areas:

- UNIX, C, C++
- ORACLE DBA
- DB2 DBA
- Mainframe Assembler Applications
- AS/400
- Client/Server
- VAX/VMS

Willingness to travel preferred.

Please mail or fax your resume with salary history (principals only, please) to:

GILCOR ENTERPRISES, INC.

Attn: Ms. Judy Rabinowitz
1776 E. 22nd Street, Suite 510
Oakbrook Terrace, IL 60181-4477 Fax: (708) 916-6006
Equal Opportunity Employer

Join Our Growing Teams In Dallas, Raleigh, St. Louis

- ADABAS/NATURAL
- VAX/VMS/DECnet/CMS/MMS
- ORACLE/SQL/Powerbuilder
- CLIPPER/PASCAL/VAX
- 4TH Dimension/Oracle
- C/C++/OS2/DOS/Windows
- UNIX/C/C++
- FoxPro
- Paradox
- IDMS
- DB2
- IMS
- dBase

Please send resumes to: Belcan Information Services, Dept. C, P.O. Box 59870, Dallas, TX 75229-1870; 800-288-8418; fax (214) 401-3388. Equal Opportunity Employer.

Belcan

Mainframe Software Sales Representative

Growing mainframe software company in Tampa, Florida needs sales representative experienced in selling system software or hardware to large mainframe users. Proven sales track record a must. Telesales/marketing experience a plus. Competitive salary and benefit package. Call:

InfoTel Corporation
Tel: (800) 543-1982 • Fax: (813) 960-5345
EOE

IS PROFESSIONALS

Opportunities abound in the Southeast for talented, experienced (3 years minimum) Programmers. Senior PA's and DBA's. Join our talented staff and work in state-of-the-art environments on challenging projects.

- Cobol, CICS, DB2
- DB2, CICS, Webfor
- Oracle, Unix, C, SQL Tools
- Natural, Adabas, Cobol, CICS
- Pandesa, Cobol, CICS
- DB2, CICS, APS, Client/Server
- Wang VS Technical Support/Systems Admin.
- Mainframe Analyst
- Cobol, CICS, Easytrieve+, VSAM
- Pertran, Ingres 4GL, PMS, Rapidwriter
- Cobol, CICS, Banking
- Banking Business Analyst
- VAX, Cobol, PMS, Oracle

We offer excellent compensation relocation assistance full benefit package and education reimbursement. Send your resume TODAY!

AMERICAN COMPUTER PROFESSIONALS
140 Stoneridge Drive
Suite 350
Columbia, SC 29210
800-933-9227
FAX 803-779-1955
Equal Opportunity Employer

Senior Programmer Analyst (Brentwood, TN) to analyze, design, implement, optimize, upgrade and test large scale information management and data processing systems using UNIFY, SQL, C, ULTRIX, MS-DOS, MS-Windows, 4GL, C-Shell, Novell LAN, DecNet, DEC, VAXstations, IBM PC (80x86) Compatibles; including database design, data manipulations and preparation of technical documentation. Require: M.S. in Computer Science with three years' experience in the job offered as described above or as a software engineer, experience gained before or after obtaining M.S. degree will be accepted. Salary: $35,000/year. M-F, 8am to 5pm. Apply with resume to: Mike Daniel, Job Serv Prog & Tech Supp, TN Dept of Employment Sec, Nashville, TN 37245-1200; Job order # TN1402927.

PROGRAMMERS
Open House Interviews, June 15, 3-7 pm.

SOFT is a top notch firm providing applications/systems solutions to the Fortune 500 in NYC, NJ and CT. We seek programmers with 2+ years experience as employees/independents.

- Mainframe, Cobol, TSO, SQL
- UNIX, C, C++
- Multimedia; Visual Basic; AI

If you have these skills we'd like to meet you. Please bring your resume. All attendees will be interviewed.

Pls. send resume or attend our Open House
Tel: 212-633-1515 • Fax: 212-633-6479
SOFT Inc. 137 Varick St, 3rd Fl. NYC 10013

ANOTHER REASON WHY COMPUTERWORLD RECRUITMENT ADVERTISING WORKS ...

Computerworld gives you large numbers of professionals who work in your industry.

When you're recruiting computer professionals, it's often important to find ones with experience working on systems specific to your industry. From manufacturing to banking, healthcare to insurance, Computerworld's audience of 629,204 is made up of the right people in every major industry.

Industry	Experienced Professionals in Computerworld's Audience of 629,204 (multiple responses given)
Computer Vendor and Consulting	236,791
Computer Manufacturer	92,524
large-scale computers	58,896
medium-scale computers	43,832
small-scale computers	39,210
personal computers	58,385
technical workstations	27,361
Software Vendor	218,027
for large-scale systems	90,605
for medium-scale systems	68,763
for small-scale systems	58,422
for personal computers	97,695
for technical workstations	33,217
Non-CPU Computer Products Manufacturer	42,051
VAR/Dealer/Retailer	27,772
DP Service Bureau/ Contract DP Services	71,293
Consulting/Planning	76,848
Manufacturer (not computers)	202,131
Insurance	91,117
Healthcare	48,866
Banking/Financial Services	116,696
Government Federal/State/Local	114,677
Business Service (except DP)	63,793
Communications Systems	55,744
Public Utilities	24,931
Transportation	51,533
Wholesale/Retail Trade	107,725
Education	92,761

SOURCE: Skill Survey of Computerworld's Audience, August 1992.

To place your ad regionally or nationally, call John Corrigan, Vice President/ Classified Advertising, at 800/343-6474 (in MA, 508/879-0700).

COMPUTERWORLD
Where the qualified candidates look. Every week.

Midwest

IS MGR. - AS400
SMALL MISSOURI COMMUNITY

Successful degreed 400 mgr. w/recent mfg. applications sought by mid-sized shop. Supervise 12. Excellent credentials & desire to live in small town req'd. Send resume or fax to:

DON APPLE
ROBERT HALF OF KC, INC.
127 W. 10th, Suite 956
Kansas City, MO 64105
Tel: (816) 474-4583
Fax: (816) 474-1422

PROJECT MANAGERS
Payroll/Personnel or Financial

Permanent position available for professionals with strong project management, business analysis, implementation and training experience. Candidates should have experience working with integrated mainframe or midrange systems and be able to communicate well with upper management. Travel required. SZK, CYBORG, OR PEOPLESOFT experience a plus! SEND RESUME TO:

Personnel Dept./Re: Proj. Mgr.
HCA International, Inc
990 Hammond Drive, Suite 810
Atlanta, GA 30328

NEW CAREERS

LAN [illegible] To $67K
CLIENT SERVER-UNIX To $55K
Cleveland, OH • 216-331-1757
1360 Beguel •(216) (440) 746

VAX VMS C Soft. Eng To $58K
C OS/2 GUI Prog. Analyst To $58K
Shawnee Mission, KS • 913-236-6288
6405 Metcalf, Suite 502, 66202

Multiple positions $ OPEN
Milwaukee, WI • 414-355-9363
P.O. Box 20866, 53226

National Computer Associates

Programmer/Analyst - La Crosse, WI - Enhance, modify systems modules and programs; write specifications; implement, test, network hardware/software across multiple platforms; maintain databases; use multi CPU Pyramid, Oracle, Application Foundation, PROC, NETWARE 3.0, OS/2 shell programming. 3 years experience. Applicant must have 18 months experience using each hardware/software tool listed above. 40hr/wk (8-6); $35,000/yr. Send resume in duplicate to: Paul Schwartz, Case #930145, La Crosse Job Service Office, 508 5th Ave. South, La Crosse, WI 54601.

Data Processing

TECHNICAL ASSOCIATE

Evanston Consulting Firm seeks bright, talented programmer for project support role. B.S. in computer science showing academic excellence, two years of IS experience, and a high degree of motivation is a must. Experience with UNIX, SAS-Base or databases is a plus. The candidate will provide in-house data analysis and data management support to consulting projects.

Send resume and salary history to Patrice K. Marshall, ZS Associates, 1800 Sherman Avenue, Suite 700, Evanston, IL 60201. Equal Opportunity Employer

COMPUTER PROGRESS UNITED

We provide Fortune 500 companies with consulting and programming services. We have immediate positions available for

Production Control
(managers & analysts)
DBAs • Systems Progs.
OPMS / Analysts

Send resume or call:
Computer Progress United
12720 Townpark Way
Louisville, KY 40243
(502) 245-8833

AS/400 RPG Programmers Programmer Analysts

Melvin Simon & Associates, Inc., a leading developer and manager of shopping centers across the United States, currently has opportunities available at our Indianapolis headquarters.

We are undertaking a major platform change to the AS/400 and we're looking for progressive individuals who look to the future with ambition and persistence.

Successful candidates will design, develop and maintain computer systems to support a full complement of business functions. Two to four years AS/400 or RPGIII experience with financial systems and a B.S. in Computer Science or related discipline required. J.D. Edwards software experience would be helpful. Individuals must have a proven track record of implementing computer solutions and solving business problems, as well as excellent analytical and communication skills.

We offer an excellent compensation package including relocation assistance. For consideration, please send resume and salary history in confidence to: Melvin Simon & Associates, Inc., Dept. SM-CW, P.O. Box 7886, Indianapolis, IN 46207; FAX: (317) 269-3218. EOE

SIMON
MELVIN SIMON & ASSOCIATES, INC.

System Analyst, 40hrs/wk, 9-6, $35.16/Hr. Maintain company on site computer network systems. Design new integrated accounting systems & maintain existing systems using IBM PC/compatible to meet current & future needs. Supervise the development of new database handling system for use in non-cash accounting system. Train staff in providing services including troubleshooting operating systems, local area networks, & data communication hardware/software I/O control. Train end users to utilize & document new systems according to departmental standard. Create, maintain, & upgrade system documentation using graphical software packages on IBM PC & Macintosh. Supervise & provide technical assistance to 3 software analysts. Min req's: MS with a major field of study or concentration in Computer Science, 6 mos in I/O programming (device driver) using TOOLC & TCP/IP communication protocols in networking environments & in other systems or software analysis, 3 graduate credit hrs in both data processing & computer architecture. Past design of an integrated database/accounting system. Apply at the Texas Employment Commission, Dallas, Texas, or send resume to the Texas Employment Commission, TEC Building, Austin, Texas 78778. J.O. #TX6886511. Ad Paid by an Equal Opportunity Employer.

International Systems Specialist wanted to coordinate system design projects between parent corporation and its foreign affiliates and supervise employees involved in projects; manage and control the design, development and implementation of international computer programs on worldwide information projects; design, code, test and implement automated and manual systems using IBM AS/400, LAN, IBM Link and S/38, and confer with consultants in a variety of fields to ensure compliance of systems with standard practices of each country where affiliate corporation in doing business. Requires Bachelor of Science Degree in any Science or Mathematics field, and two years experience in job offered or 2 years experience in the related occupation of Computer Systems Analyst, the 2 years of experience must include experience using IBM AS/400, LAN, IBM Link, and S/38; 40 hours per week; 8:00 a.m. to 5:00 p.m.; $47,000.00 per year. Send resumes to 7210 Woodward Avenue, Room 415, Detroit, Michigan 48202. Reference No. 44793. "Employer Paid Ad."

Programmer Analyst

International firm with headquarters in the Detroit metro area is seeking an experienced Programmer Analyst. We have an MVS/ESA mainframe environment using CICS, COBOL II, TSO/ISPF, and CA/ROSCOE. A strong business orientation in addition to technical skills will qualify you for this high profile position. Valuable additional experience will include familiarity with DB2, SQL, and ASSEMBLER language. If you have the background, we would like to hear from you. In addition to a creative and challenging environment, we offer:

- Competitive salary and benefits
- Relocation assistance
- 401K
- Technical and corporate support

Send your resume in strictest confidence to: **V.P. Human Resources, P.O. Box 0946, Warren, MI 48090.** Equal Opportunity Employer.

AS/400 Programmer/Analyst

One to two years experience in developing systems using structured methodologies and Synon in an AS/400 environment required. Must be able to work closely with and users to define requirements, design databases, code programs, design and complete unit and system tests, and support installed applications.

Please send resume and salary requirements to K-C Aviation Inc., Human Resources, P.O. Box 7145, Dallas, TX 75209.

KC Aviation INC

EOE/ M/F/D/V

Join Our Growing Teams In Dallas, Raleigh, St. Louis

- ADABAS/NATURAL
- VAX/VMS/DECnet/CMS/MMS
- ORACLE/SQL/Powerbuilder
- CLIPPER/PASCAL/VAX
- 4TH Dimension/Oracle
- C/C++/OS2/DOS/Windows
- UNIX/C/C++
- FoxPro
- Paradox
- IDMS
- DB2
- DMS
- dBase

Please send resumes to: Belcan Information Services, Dept. C, P.O. Box 59870, Dallas, TX 75229-1870; 800-288-8418; fax (214) 401-3388. Equal Opportunity Employer.

Belcan

MAINFRAME SOFTWARE SALES

Sequel Corp., the leading provider of automation software for QA testing, EDI, and system operation has new opportunities available in Overland Park, KS for SALES ACCOUNT REPRESENTATIVES. Responsibilities include telemarketing and direct sales, conducting product presentations / demonstrations, and trade show work. Qualified candidates are proven professionals with experience in mainframe software. If you feel you qualify to be part of our growing team, send your resume, including past salary and compensation history, to: Sales Director, Sequel Corp., 1300 So. Meridian, M/S 304, Oklahoma City, OK 73108.

Sequel CORPORATION

IEF Pros...

JOIN CAP GEMINI –
APPLY ADVANCED "TOOLS"
TO SHAPE THE FUTURE

CAP GEMINI AMERICA provides SOLUTIONS that result in our *competitive advantage* for our clients. Our parent company, CAP GEMINI SOGETI, is the fourth largest information technology company in the world, with operations in 16 countries.

We seek high-energy individuals with at least 1 year of IEF in the BAA and BSD phases. Skills in full life cycle use of IEF would be a plus. You should be comfortable in both high level business communications and technical discussions about Information Engineering. You should also bring to the position a BA/BS degree or equivalent, and demonstrated ability to work in a team environment.

In this suburban, Cleveland-office based position, you'll discover a stimulating technological atmosphere, a very attractive compensation-benefits package, and excellent professional growth prospects. Qualified and interested? Send resume to J. Cohen, Employment Manager; CAP GEMINI AMERICA; Three Commerce Park Square; 23200 Chagrin Blvd.; Beachwood, OH 44122 ...or FAX to 216/464-5316.

An Equal Opportunity Employer

CAP GEMINI AMERICA™
Member of the CAP GEMINI SOGETI Group

IS PROFESSIONALS

Opportunities abound in the Southeast for talented experienced (3 years minimum) Programmers, Senior PA's and DBA's. Join our talented staff and work in state-of-the-art environments on challenging projects:

- Cobol, CICS, DB2
- DB2, CICS, Walker
- Oracle, Unix, C, SQL Tools
- Natural, Adabas, Cobol, CICS
- Pacbase, Cobol, CICS
- DB2, CICS, APS, Client/Server
- Wang VS Technical Support/System Admin.
- Multimedia Analyst
- Cobol, CICS, Easytrieve+, VSAM
- Fortran, Ingres 4GL, FMS, Repositories
- Cobol, CICS, Banking
- Banking Business Analyst
- VAX, Cobol, FMS, Oracle

We offer excellent compensation relocation assistance full benefit package and education reimbursement. Send your resume TODAY!

AMERICAN COMPUTER PROFESSIONALS
140 Stonecrop Drive
Suite 350
Columbia, SC 29210
800-833-9227
FAX 803-779-1955
Equal Opportunity Employer

Applications Programmer

International services firm with corporate offices located in metro Detroit area is seeking an experienced Applications Programmer with the following background:

- MVS/ESA
- TSO/ISPF
- COBOL II
- CA/ROSCOE
- VSAM
- SQL
- CICS
- ASSEMBLER
- DB2
- HRM/FINANCIALS

If your experience parallels this profile, forward your resume in strictest confidence today. This position offers: competitive salary, company paid benefits, 401K, and a challenging and creative environment.

For consideration, send your resume to: **V.P. Human Resources, P.O. Box 0905, Sterling Heights, MI 48311.** Equal Opportunity Employer.

Southeast

Computer Consulting Group has immediate openings on its southeast consulting staff for talented Programmer/Analysts. We're especially seeking:

- **IMS or CICS or DB-2**
- **APS**
- **Mapper**
- **Wang Pace**
- **Clarion or Progress**
- **Powerbuilder or GUI**
- **Unigraphics or Unifocus**

Computer Consulting Group
Contract Professional Services

4109 Wake Forest Rd.
Suite 307
Raleigh, NC 27609
1-800-222-1273
FAX (803) 738-9123
Member NACCB

Our Clients Consult With the Best...

...GILCOR ENTERPRISES, INC. and you!

Headquartered in Chicago, we are a nationwide consulting firm with upcoming projects in the Midwest and Atlanta areas. We are looking for Technical Consultants on a per project basis. Qualified candidates will have senior level experience in one or more of the following areas:

- UNIX, C, C++
- AS/400
- ORACLE DBA
- Client/Server
- DB2 DBA
- VAX/VMS
- Mainframe Assembler Applications

Willingness to travel preferred.

Please mail or fax your resume with salary history (principals only, please) to:

GILCOR ENTERPRISES, INC.
Attn: Ms. Judy Goldsmith
1710 Oakbrook Center
Oakbrook Terrace, IL 60181-4477 Fax: (708) 629-0388
Equal Opportunity Employer

HOGAN SYSTEMS OPPORTUNITIES . . .

Come Grow With Us

Society Corporation's Information Technology and Operations Group has one of the most technically advanced data processing centers in Northeast Ohio. Our corporate-wide mainframe and PC systems and our commitment to apply leading edge technology have created unusual career growth opportunities for individuals who are interested in a dynamic environment. By developing superior human resources and well defined skills and systems, Society will become the leading provider of financial services to our customers. Perhaps it's time to . . . come grow with us.

PROGRAMMER ANALYSTS

These expansion positions offer a unique opportunity to enhance your current technical skills and become part of a team committed to providing quality systems solutions to its clients. You will be given an opportunity to work with a wide range of HOGAN products: IDS Release 1.2, ILS, PCS, UMBRELLA, and PASS.

Your responsibilities will include creating program specifications, developing software, and providing production support for deposit and loan applications while you are trained to develop system interfaces to DB-2 oriented applications. Successful candidates will have a minimum of two years of experience with COBOL, VSAM, and OS JCL; deposits and loans applications experience or HOGAN system experience strongly preferred.

If you like diversity in your daily activities and enjoy learning new technology in a fast-paced development environment, please submit your resume and cover letter in confidence to:

Ms. Sandy Opacich, Society Corporation
127 Public Square, Mail Code 01-127-0901
Cleveland, OH 44114-1306
or call 1-800-523-7248
extension 43428

Society

LOOKING FOR A CONSULTING FIRM THAT OFFERS A DYNAMIC CAREER PATH, STABILITY AND A FUTURE?

You should join COMPUTERPEOPLE. We offer 13 different technical training courses and we are the only organization in Florida to offer Platinum technology DB2 courses. Technology moves forward — we help you move with it!

If management is in your future, you may have the opportunity to participate in our first level supervisory development and site manager program.

The occupational stability we offer comes from being the largest firm in Florida. We don't hire "suits" - we hire people that STAY with us - year after year. If consulting or something you are considering . . . consider COMPUTERPEOPLE.

IBM Mainframe • IBM Midrange • Unix
Tandem • DBMS Software Products
• Arthur Anderson Tools & Software

COMPUTERPEOPLE

Please mail or fax your resume for consideration to: COMPUTERPEOPLE, Dept. 532

201 S. Orange Ave., Suite 1020, Orlando, FL 32801
407-426-7755 • FAX 407-843-6153
9118 Cypress Green Dr., Jacksonville, FL 32256
904-739-3948 • FAX 305-389-0204
12225 28th St. N., St. Petersburg, FL 33716
813-573-2626 • FAX 813-572-1153
3265 Meridian Pkwy., Ste.122, Ft. Lauderdale, FL 33331
305-384-0999 • FAX 305-389-0204

Attention C++ and Assembler Professionals

If you enjoy the challenge of developing mission-critical software for use by leading-edge companies around the world, it is time to look into a Compuware career. The success of our family of programmer productivity software products is creating more opportunities every day.

If you are the best at what you do, we would like to talk with you about the future. Today we have opportunities in the following areas:

PROJECT MANAGERS - to play a hands-on role managing the creation of new products and support of existing products. We are seeking candidates with **three years prior project management and technical experience** in any of the following areas:

- **IMS Database Administration** - Preferred candidates will have experience in Assembler or PL/1.
- **CICS Internals** - Extensive CICS application support.

PRODUCT DEVELOPERS - to design new products, or enhance and maintain our current products.

- **OS/2, Windows, PC/DOS** - A thorough understanding of Object-Oriented Programming,C++ or experience in C, PC Assembler, OS/2 Presentation Manager, or Windows/NT.
- **IMS or DB2** - A thorough understanding of IMS or DB2 Database Administration with Assembler or PL/1 is necessary.
- **CICS** - A thorough understanding of CICS internals and 370/Assembler is necessary.

PRODUCTS SUPPORT REPRESENTATIVES - to provide the highest level of professional and technical assistance to **Compuware's** customers and sales staff. We have opportunities for Application Programmers with expertise in:

- **OS/2, Windows, PC/DOS** - to provide support of our PC-based products.
- **IMS or DB2** - to provide support of our database products.
- **CICS** - to support our customers and sales staff in the use of Compuware's CICS-based products.

If you'd like to be part of our growing team, send your resume and salary expectations to: Compuware Corporation, Dept. CW14, 31440 Northwestern Highway, Farmington Hills, MI 48334. These positions are located in Michigan, California, and Illinois.

COMPUWARE.

AN EQUAL OPPORTUNITY EMPLOYER

"Technology by itself is not valuable to anyone, so it's our job to transform it into products that deliver value to the customer."

– John Williams, Director – Applied Technology

SOFTWARE ENGINEER - 40 hrs./wk., 8am-5pm, $40,200/yr. To research, design and develop computer software systems for a variety of applications. Carry out system testing, implementation and documentation. Require Bachelor's degree in Computer Science, Engineering, Math, Physics, 3 yrs. exper. in job offered or 3 yrs. exper. as Programmer/Analyst. Experience in systems analysis utilizing HP3000, AS/400 & NOVELL, STRIEVE, VIEW, IMAGE, RPG II & RPG/400 software. "Employer paid ad". E.O.E. Send resumes to: 7310 Woodward Ave., Rm. 415, Detroit, MI 48202. Ref. No: 43493.

TPF CONSULTANTS

1-800-599-9550

Structured Logic Company, Inc.

[illegible]

CONSULTANTS

CONNECTICUT AREA ■ IEF ■ ADW ■ SYNON

Rapidly expanding IE/CASE practice is seeking professionals with minimum of one year experience with tool. Company also has full time and contract openings for applications developers with three or more years experience in:

■ DB2/CICS
■ DB2/IDMS/IBM/DATACOM DB
■ SYBASE/SOLBASE
■ AM400/RPG III/COBOL
■ POWERBUILDER
■ POWERBUILDER
■ DB2/WINDOWS/C++/GUI
■ ORACLE
■ SAS
■ CLIPPER/FOCUS/PARADOX

Advanced Computing Technologies, Inc. offers clients full application development services from feasibility to implementation. Send or fax resume to:

ADVANCED COMPUTING TECHNOLOGIES, INC.
41-B New London Turnpike, Glastonbury, CT 06033, (203) 633-4633, (203) 657-2087 (fax)
40 Richards Avenue, Norwalk, CT 06854, (203) 852-1729, (203) 857-0822 (fax)

SMALLTALK PROFESSIONALS

If you are an Experienced Smalltalk Developer
This is Your Opportunity to Join the
MOST EXCITING Team of Object Technology
Professionals in the Country!

Roth Weil International, RWI
has Challenging Projects Across the US

PO Box 270566, Houston, TX 77277-0566
(800) 256-0541 (713) 960-8060
FAX: (713) 961-1154

TANDEM

COBOL, PATHWAY,TAL, SCOBOL,C, SQL,X.25

STRATUS

PL1,COBOL,C ON/2

MUMPS

DSM, ISM, MSM, GTM, IBM RISC/6000. Powerbuilder Fulltime/Consulting Positions available in the US/ABROAD

STRATEM

800-582-JOBS
TEL (212)967-2910
FAX (212)967-4205
124 W 30th St. Suite #302
New York, N.Y.10001

TANDEM

Professional Placement

Full/Contract Nationwide

The Tucson Group

(515) 923-2891
FAX (515) 923-3788

Sunbelt Opportunities

[illegible]

North Carolina's largest employment agency in business since 1971. 300 plus Modern Opportunities in the Southeast and nationwide. Fee paid.

CORPORATE PERSONNEL
3700-320 Latrobe Drive, Box 221730
Charlotte, NC 28222 (704) 366-1000
Attn: Rick Young, C.P.C.

CONSULTANTS to N. CALIF

- VAX/VMS - ASK, RS1, TOLAS
- INGRES - DB Designers & P/As
- HP3000 P/As
- ORACLE Financials
- SYBASE Appl. Developers
- TANDEM Programmers

The Lipson Conroy Bros Co.
1900 McCarthy Blvd #208
Milpitas, CA 95035
(408) 955-7200
FAX (408) 955-7207

Nationwide Opportunities

Contract/Permanent

ORACLE DBA
ORACLE FINANCIALS
ORACLE CASE
DB2 Data Analyst
POWERBUILDER
M&D MILLENNIUM
IMS/DB2 PA's
SYBASE DBA

Mail/fax resume to:

ABSI
P.O. Box 26242, O.P., KS. 66225-6242
Fax (913) 681-2237
Call (800) 775-6177

MCI
MCI
MCI
MCI
MCI
MCI
MCI
MCI
MCI
MCI
MCI
MCI
MCI
MCI
MCI
MCI
MCI
MCI

MCI SYSTEMS ENGINEERING
Technology & Opportunity!

Innovation begins with ideas, making the right choices and having an independent mind set that is able to work within a team framework. MCI has achieved success and become a $10 billion company by gaining the competitive edge that comes from professional interaction and use of advanced technology.

We offer a competitive salary and benefits package, plus opportunities for professional development and training for participants in MCI's challenging career climate in Colorado Springs, Colorado or Cedar Rapids, Iowa:

COLORADO SPRINGS, CO

Colorado Springs is a clean, healthy environment for year 'round outdoor recreation that's just one hour away from Denver.

IBM SYSTEMS PROGRAMMERS
(Response Code Dept. 1206/RFCW)

- Systems Programming
- Performance Tuning & Capacity Planning
- DASD Management
- Database Administration

Experience is required in:

MVS/ESA, DFP/ESA, DFHSM, DFSMS, DFDSS, CICS, DB2, IMS, ADABAS, RACF, Teleview, VTAM, Netview, JES, Omegamon, SMP/E, MICS, SAS

IBM/VAX APPLICATIONS DEVELOPERS/PROGRAMMERS
(Response Code Dept. 1206/SDMH)

IBM MAINFRAME

- COBOL
- CICS
- DB2
- VSAM
- C, C++
- ADABAS/NATURAL
- WINDOWS / OS/2
- PRESENTATION MANAGER
- VTAM
- TOKEN RING
- X.25/X.400
- FOXPRO
- SYBASE
- LU6.2
- TESTERS

VAX

- VAX/VMS
- C, C++
- POWERHOUSE
- UNIX, ULTRIX
- DECNET
- ETHERNET
- DECTOOLS
- WINDOWS
- SNA
- VTAM
- LAN/WAN
- X.25/X.400
- TESTERS
- OSI
- STRATUS

Send your resume to: **MCI Telecommunications Corporation, 2424 Garden of the Gods Road, Colorado Springs, CO 80919 or FAX to (719) 535-1900. Include Response Code.**

CEDAR RAPIDS, IA

Cedar Rapids features a high quality of life with active community involvement, excellent education systems and diverse cultural events.

APPLICATIONS PROGRAMMERS/DEVELOPERS

IBM MAINFRAME

- COBOL, COBOL II
- CICS
- VSAM
- Intertest
- DB2
- Structured Development Methodology
- Lifecycle Development Process
- CASE Tools
- Functional Requirements Analysis
- User Acceptance Testing
- IMS
- ADABAS/NATURAL
- SAS
- TSO/ISPF
- MVS/ESA

PCs/MICROS

- C, C++
- OS2, UNIX, AIX, MS-DOS
- PRESENTATION MANAGER
- DATABASE MANAGER
- WINDOWS DEVELOPMENT
- SYBASE
- LU6.2
- FOXPRO
- TOKEN RING
- ETHERNET
- LAN/WAN

VAX

- VAX/VMS
- C
- DECNET
- POWERHOUSE
- DECTOOLS
- VAX CLUSTER

Send your resume to: **MCI Telecommunications Corporation, 500 Second Avenue SE, Cedar Rapids, IA 52401 or FAX to (319) 398-4210.**

We are an equal opportunity employer.

MCI

Contract SOLUTIONS

INFORMATION SYSTEMS

- AS/400, COBOL OR RPG
- PROGRESS, UNIX, FINANCIAL/MANUF APPS
- ORACLE, FORMS 3.0, C OR COBOL
- RDB, ACMS, DEC FORMS, C OR COBOL
- IMS, COBOL, COBOL II, EDI
- NATURAL, ADABAS, DYL 280, COBOL
- NEW ADMIN: TCP/IP, PATHWORKS, DECNET, BANYAN
- SYSTEM MGRS: VMS, UNIX, MSDOS, OS/2

SOFTWARE

- TCP/IP, X.25, SNA, LU 6.2, C
- C++ PROGRAMMERS: ALL PLATFORMS
- UNIX, C, O/S MODS, TRUSTED SYSTEMS
- WINDOWS NT, C, PORTING
- MULTI-MEDIA, DIGITAL VIDEO, C, COMPRESSION
- MASS STORAGE, DRIVERS, C, UNIX
- TELEWINDOW: T1, SONET, DS3, UDP/IP

Contract SOLUTIONS
Two Executive Drive
Salem, NH 03079-4875
• 603-893-6776
Fax: 603-893-6788
1-800-998-CSI 1 (2741)

MS WINDOWS DEVELOPERS

Wisconsin's largest professional services firm, Computer People Unlimited, is looking for **MS Windows Developers** with the following skills:

- 5 years' C programming
- 1 year **recent** MS Windows programming

Plus one or more of the following: Virtual Device Drivers, Visual C++, VisualBasic, Smalltalk, Smalltalk Parts, Custom Controls Development. If you're ready to make the right career move, give us a call. Contact Julie Endlich at 414-225-4000 or 1-800-527-8462. You may also send your resume in confidence to: CPU, Dept. CW-0607, 732 N. Jackson St., Milwaukee, WI 53202. Fax: 414-225-4011. We are an equal opportunity employer.

CPU

MIS
INTERNATIONAL INC.

Because Your Future is our Business

M.I.S. International is one of Michigan's oldest and most respected consulting firms. For over 21 years, our data processing and engineering professionals have provided services to Fortune 500 firms including the major automobile manufacturers and suppliers.

We are enjoying exceptional growth, in both our Michigan Headquarters and Louisville, Kentucky Division, making this a perfect time to step up to a permanent position on our technical staff. Currently available opportunities include:

- CICS/DB2, COBOL
- IMS DB/DC, COBOL
- IMS DB/DC DB2, COBOL
- INSTRUCTOR - CLIENT SERVER TECHNOLOGY
- DIALOGUE MANAGER, BATCH DB2, COBOL II
- INQUIRE, OS/JCL, DIALOGUE MANAGER
- SYSTEM ADMIN. - UNIX or OS/2 or DOS
- C or C++, GUI, UNIX or OS/2 or DOS
- ORACLE 6.0 - 7.0, SQL FORMS 3.0, FORTRAN or C, VAX/VMS or UNIX
- SAS 6.08
- DBA - IMS DB2
- REAL TIME - FORTRAN, VAX/VMS

Call our Recruiting Department at 1-800-860-3377, or forward your resume to: M.I.S. International, Inc., Corporate Headquarters, 445 Enterprise Court, Bloomfield Hills, Michigan 48302. FAX: 313-253-8506. Equal Opportunity Employer.

EXCELLENCE IN SOFTWARE CONSULTING

We're the Registry, a dynamic, rapidly growing software consulting company dedicated to excellence. Our solid reputation is built on our commitment to understand and meet the needs of our clients and consultants, and to provide superior service to both on a day-to-day basis.

National — Contact: Dan (800) 248-9119 FAX (617) 527-8805
ORACLE/FORMS 3.0/CASE ++ • VISUAL BASIC • PC EXPRESS • C/ACMS/RDB • VAX/MPS • NETWORK MGRS • VAX/RALLY/RDB

Atlanta, GA — Contact: Jeff (800) 255-9119 FAX (404) 257-0566
ASSEMBLER CICS • IMS/DB2/CICS • MEDIPAC • MS-WINDOWS/C++ • SYBASE/ORACLE • AS/400 RPG III

Boston, MA — Contact: Keven (800) 248-9119 FAX (617) 527-8805
DB2/TELON/COBOL • IMS/DB-DC • MS-WINDOWS/C++ • VISUAL BASIC/C++ • UNIX SYS AD • ORACLE/SYBASE

Chicago, IL — Contact: Bill (800) 617-9119 FAX (312) 558-1388
SAS/AF/UNIX • UNIFACE • IMAGING PROJ. MGR. • MC & DODGE-AP/GL • INFORMIX/HP-UX • APS ONLINE EXPRESS

Cleveland, OH — Contact: Ed (216) 328-9900 FAX (216) 328-9338
CICS • DB2 • VAX SYSTEM MGT/ALL-IN-ONE • UNIX • AS400/COBOL/RPG3 • TANDEM SYSTEM ADMINISTRATOR

Durham, NC — Contact: Lori (800) 338-9119 FAX (919) 544-9668
POWERBUILDER • UNIX/C++ • UNIX/INGRES • AUTOTESTER • UNIX/PRO*C • ORACLE DBA • CICS/COBOL/AMAPS

New York, NY — Contact: Sue (914) 937-9119 FAX (914) 937-3314
FTI/CUSTODY • SYBASE/POWERBUILDER • EASEL • X-WINDOWS/MOTIF/C++ • LOTUS NOTES • SNAP • ORACLE DBA • DB2 DBA • VAX/FORTRAN/RDB

Richmond, VA — Contact: Skip (804) 747-1000 FAX (804) 346-0510
DB2 • AS/400/RPG II • SYBASE/UNIX • INFORMIX • ADABASE/NATURAL • PROGRESS • J.D. EDWARDS • SAP • MAC/AP/HYPERCARD

San Francisco, CA — Contact: Mike (800) 248-9119 FAX (617) 527-8805
INFORMIX-4GL/WINDOWS 3.1 • X-WINDOW/MOTIF • OS-2/PM/C++/UNIX • ORACLE/FORMS 3.0/PRO*C • NETWORK MGRS/PATHWORKS

Washington, DC — Contact: Kris (800) 367-9119 FAX (703) 790-8467
UNIX SYS ADMIN • FRAME RELAY • FIREBERD • SYBASE DBA • MVS/ESA/AIX • UNIX/C/X.25

Find out what it's like to consult with a company that's building long-term relationships based on quality, strength, integrity and vision.

The Registry
189 Wells Avenue, Newton, MA 02159
(617) 527-9119 FAX: (617) 527-8805

Member NACCB An Affirmative Action/Equal Opportunity Employer

The Registry

UNIVERSITY OF FLORIDA

DIRECTOR, INFORMATION SYSTEMS

The College of Dentistry is currently recruiting for a Director, Academic Support Services (Director, Information Systems). The University of Florida is a land-grant institution, affiliated with the Association of American Universities (AAU). Dedicated to teaching, research, and extension, the University has a student enrollment of 34,000 and employs approximately 11,000 faculty and staff members.

Salary commensurate with qualifications. Minimum qualifications: Master's degree in an appropriate area of specialization and six years of appropriate experience or a Bachelor's degree in same and eight years of appropriate experience. Advanced training and/or experience in systems design, analysis and management, relational database experience (Oracle, SQL), networking, UNIX, personal computers, and a high level of conceptual and communication skills strongly preferred. Experience in health care systems, IBM mainframes (VM), multi-vendor networks, and academic computing highly desired.

Please send cover letter and resume to Greg Manwaile, University Personnel Services, 4th Floor Stadium 952500, Gainesville, FL 32611 by July 30, 1993. If an accommodation is needed to apply for this position, please call (904) 392-4621 or TDD (904) 392-7734. AA/EA/EEO

Hiring Managers

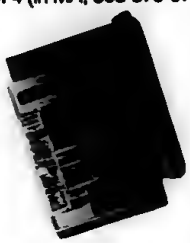
Recruit qualified computer and communications professionals with the IDG Communications Computer Careers Network of five leading computer newspapers. For more details. Call Lisa McGrath at:

(800) 343-6474
(in MA, 508/879-0700)

Attention, IS Directors!

Recruit computer professionals in the one newspaper that reaches more QUALIFIED professionals than any other newspaper: *Computerworld.*

For more information or to place your ad, call Lisa McGrath at 800-343-6474 (in MA, 508-879-0700).



Weekly. Regional. National. And it works.

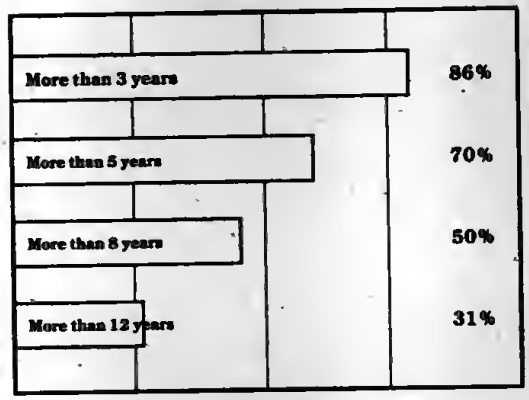
An IDG Communications Publication

ANOTHER REASON WHY COMPUTERWORLD RECRUITMENT ADVERTISING WORKS ...

Computerworld gives you only qualified computer professionals.

Unlike the readers of Sunday or daily newspapers, every Computerworld reader is an experienced computer professional. In fact, the majority of Computerworld's audience has experience beyond three years. What's more, some subscribers have been reading Computerworld ever since its first issue in 1967. Simply put, Computerworld delivers far more than just job candidates - it delivers qualified job candidates.

Years in Current Job Function Reported by Computerworld's Audience of 629,204



Source: Skill Survey of Computerworld's Audience, August 1992.

To place your ad regionally or nationally, call John Corrigan, Vice President/Classified Advertising, at **800/343-6474 (in MA, 508/879-0700).**

COMPUTERWORLD
Where the qualified candidates look. Every week.

SOUTHWEST

Texas/Oklahoma Opportunities. Salaried Consultants. Hourly Contractors, and direct full-time openings for software professionals with 2+ years of hands-on professional experience utilizing one of the following:

VPP/SAMMITALK P/A's
DBS/PL1 P/A's
DB2/PL1 P/A's
IMS/DB2 DBA's
SR. UNIX/ADMINISTRATOR
POWERBUILDER P/A's
AS400/C/TCP/IP
AS400/RPGIII P/A's
IDEAL/DATA600 P/A's

For confidential consideration or more information, please call, mail or fax resume to:

MTM Corporation
2021 S. Lewis
Suite 325
Tulsa, OK 74104-5721
918-745-9600
FAX: 918-745-9609

HOGAN

50+ Openings, Nationwide
Immediate Hire!!
Permanent and Contract

- **Vice President; IBA:** IDS/ILP. Outstanding upward mobility, Superbank - Only the best need apply 150K
- **Assistant Vice President:** IDS, CIS, ILP, Multiple positions . . . . . TO 90K
- **Project Managers:** IDS, CIS, PAS, RPM. Several different levels . . . . . TO 90K
- **Programmer(s):** IDS, CIS, ILP, RPM, IRS, DISC, VECTOR 5, CAMS. (3-15+ yrs. exp.) . TO 70K
- **Analyst(s):** IDS, CIS, ILP, RPM, IRS, DISC, VECTOR 5, CAMS. (3-15+ yrs exp.) . . . TO 75K
- **Business/Functional Analyst(s):** IDS, CIS, ILP. Develop, implement & liaison . . . . TO 70K

MUST HAVE HOGAN EXPERIENCE!

Tele/Data
PH: (716) 883-0777, FAX: (716) 883-0933

CONSULTING

NATIONAL OPPORTUNITIES AND REGIONAL OPENINGS IN

BOSTON • D.C. • NEW YORK

Over 200 long-term leading-edge MIS and software engineering assignments.

MF • SDSE • RDBMS
TOOLS • REPOSITORY
SUBASE • EXPERTSEN
SYSTEMS • APPLICATIONS
SUPPORT

Investigate an alliance-oriented professional services company! One call provides access to all.

800.to.KENDA x30
Fax: 800.800.2016

KENDA SYSTEMS

One Willow Rd., mile Alli
Salem, NH 03079

EOE Member NACCB

NATIONAL MAINFRAME OPPORTUNITIES SOFTWARE DEVELOPERS ARCHITECTS

370 ASSEMBLER, C, MVS or VM INTERNALS W/
- Project Lead (hands on) DB2/UNIX internals To dev a Multi-OS, High-end Parallel product
- Dev an interface from VM to B2B engine (CMS internals)
- Architect Performance Products MVS internals
- DEV DB2 or MVS Utilities
- DEV MVS host connectivity prods-SNA VTAM NCP Network Protocols and OS-2 desired

OTHER VENDOR REQUISITIONS
- Customer & Tech Support-DB2 MVS, SNA LU6.2 or Assembler with DB2 & MVS
- PRE-post sales-Applications Exp Mainframe/PC
- Product Marketing Managers or Director
- Automated Operations Support Manager

MVS-SR.PA.SR.SA.PROJ LEAD, PROJ MGR.ETC...
*Sr MVS ESA SP-to do XA to ESA conversion (CICS, VTAM, OS-2,DB2+) *FOCUS (multi-OS) dev applications (DB2+) *IMSDBDC-MPG *BRANCH AUTOMATION IMSDBDC CICS *ORACLE VM Cobol *COMMERCIAL LOAN/CICS *ADABAS NATURAL w/Predict & Construct *CPCS/Sky Code *DB2 CICS Cobol *ISI Payroll *HOGAN-RPM, CIS or DDA *SYSTEMATICS Real Estate *CLOAS * CENCOM financials *Sensor DB2 DBA (Multi Database+)

TINA COSTA 213-695-7995 FAX 213-698-3547
MASON CONCEPTS, INCORPORATED
6380 WILSHIRE BLVD SUITE 1000
LOS ANGELES, CA 90048

CA & AZ CONTRACTS

CONSULTANTS WANTED

P Murphy & Associates, Inc.

4405 RIVERSIDE DR., SUITE 100
BURBANK, CA 91505
(818) 841-2002 (714) 562-0606
FAX: (818) 841-2122
Member NACCB

CAREERS IN COMPUTERS

$40,000 TO $75,000

IBM, DEC/VAX, RS6000, STRATUS
COBOL, CICS, POWERHOUSE, C,
IMS DB/DC, INGRES, UNIX, DB2
SYBASE, ORACLE, POWERBUILDER
LAN/WAN/SYNOPTIC/WELLFLEET
BANKING LIAISON
ADW-CONSTRUCTION WORKSTATION

FOR THESE AND OTHER POSITIONS
CALL COLLECT OR WRITE

(502) 589-3100
1800 Meidinger Tower
Louisville, KY 40202
COMPUTER CAREER CONSULTANTS INC.
350 AFFILIATED OFFICES
Client Companies Pay Fees

"First When Quality Counts"

ATLANTA

CPI has 30 immediate openings for

COBOL PROGRAMMERS

Please contact CPI at:
1100 Abernathy Rd.
Suite 1105
Atlanta, GA 30328
(404) 393-8100
Fax (404) 393-8111

Software Package Implementors

We are specialists in the design and implementation of Accounting and Financial Reporting Systems for major corporations and multinationals. We are seeking a number of Full Time Consultants with substantial experience. Candidates must have strong application experience (GL, AP, AR, FA) or a strong technical background (RDBMS) with accounting package experience.

Beacon is a Business Partner with DBS, PeopleSoft, and Lotus (Notes).

Send Resume to:
Beacon Application Services Corp.
8C Pleasant Street
South Natick, MA 01760

BEACON

At Powersoft, the strength of the individual is only surpassed by the strength of the team. We've seen our product, PowerBuilder™, become a leader in the client/server marketplace through the efforts of a strong, energetic team of professionals, working in an environment that fosters creativity, quality and fun. Powersoft continues to seek individuals to join our focused team by offering the following opportunities:

ALLIANCE MARKETING MANAGER(S)

These individuals will be the primary contacts for specific strategic platform, database, industry and other partner relationships. Work with Marketing to implement targeted marketing programs, and drive service-related partnerships with commercial software developers and consulting partners. These individuals will have a strong industry and technical background, proven negotiation skills, a track record of business success and excellent communication skills. *Contact: Traci Weaver.*

TECHNICAL ADVISORS – NATIONWIDE

These positions are a shared resource between training and consulting. You must be willing to travel extensively. Contact: Elizabeth Tepper.

Training

Train technical users of our PowerBuilder product and assist in course development. A thorough background in teaching high-level courses to a technical audience is required; with knowledge of applications developments, PCs, Windows and databases.

Consulting

Ensure clients' success in developing PowerBuilder applications. Extensive experience with client/server design and development, GUI design, SQL databases and PowerBuilder is required. Applicants should enjoy working with a wide variety of clients and possess excellent communication skills.

TECHNICAL SUPPORT ENGINEERS

We are open to discussion of job-sharing and alternative work schedules for these positions.

Provide technical phone support, training and some internal applications development to PowerBuilder customers. We require extensive experience with applications development, Windows, PC DOS and leading-edge network database management systems, as well as excellent communication and problem-solving skills.

In addition to the above, we need assistance with our **ELECTRONIC SUPPORT SERVICES.** This individual will have an extensive background working with the insides of a PC, configurations/setup and maintenance. Experience with CompuServe, BBS or other electronic aspects of the software industry would be a plus. You must be customer-oriented. *Contact: Elizabeth Tepper.*

TECHNICAL CONSULTANTS

Positions are available in: Boston, Atlanta, Chicago, New York, Washington DC, Houston, Dallas, Los Angeles, San Francisco and Toronto.

We seek experienced pros to support all aspects of the PowerBuilder selling cycle from pre-sales and demos through account management. These positions require in-depth knowledge of PCs, relational databases and PC networks along with outstanding communication skills and the ability to travel extensively. *Contact: Christe Bryson.*

INTERNATIONAL PRODUCT MARKETING MANAGER

Based in Burlington, MA

You will be the international advocate for product development, marketing and strategic alliance programs. In addition, you will focus on quality assurance and training for international distributors. We require a strong technical background with applications development, PCs and relational databases. Outstanding communication skills (including foreign languages) and the ability to be a team player throughout the company is required. This individual must be willing to travel extensively and have worked internationally. *Contact: Traci Weaver.*

In addition to an outstanding work environment, Powersoft provides excellent compensation and comprehensive employee benefits. Please send resumes to the appropriate individual at: **Human Resources, Powersoft Corporation, 70 Blanchard Road, Burlington, MA 01803; fax (617) 221-4690.** No phone calls please, all resumes will receive a written response within 2 weeks. Agencies please respond in writing after July 13. Powersoft is an equal opportunity employer actively seeking to diversify its workforce.

Powersoft™
The Power Is Our People

For an update on current and future employment opportunities at Powersoft, call our Career Line at (617) 238-1162.

Switching standards? It pays to do the math

By Linda Musthaler

If you're thinking of switching to a new personal productivity software standard — such as migrating from DOS to a graphical user interface environment — consider this: Don't shop price alone. There are many hidden costs to factor into this type of move.

The following guidelines and worksheet will help you determine those hidden costs. If you don't have a clear idea of your company's labor costs, use an average (salary plus benefits) of $40,000 per year for an information systems professional or end user.

1. Training: Training must be replaced when you move to a new software standard. Assume that all users will need at least one course in how to use the new product. In fact, training is a large expense for new products, particularly if you do most of it in-house. For example, it could easily cost $25,000 or more to train 100 employees on the basics of a new product.

2. Technical support: Demand for technical support may increase, at least temporarily. Experienced help desk managers place the typical increase at 15% to 50% above normal support demands. Factor the cost of increased demand for the duration of the new product implementation into the cost of normal support requirements.

Musthaler is an industry analyst at Currid & Co. in Houston.

Use the following guidelines to determine the change factor: 15% for a product upgrade on the same platform, 30% for a product upgrade that includes a platform change, 30% for a product switch on the same platform, 50% for a product switch that includes a platform change.

3. Product testing: Your staff will spend time evaluating and testing the new product before and after you make the decision to change your standard.

4. Administrative activities: These tasks represent a truly hidden cost, but they should be factored into the overall cost. Even though some of these activities are performed for upgrades as well as for wholesale product exchanges, the time and costs are more extensive for software switches.

Activities include researching purchase details, advertising the change to users and installing the new software.

5. File conversions: You will need to convert your work files from one product's format to another. Some conversions are smoother than others, and some are nearly impossible.

6. Custom development: Some products require custom development to optimize performance. For instance, you may want to create custom output drivers or macros to perform specific tasks.

7. Lost employee productivity: You're bound to lose productivity when switching the software tools that people use.

To quantify lost productivity costs, use the following guidelines: Allocate five hours per user for an upgrade on the same platform, 10 hours per user for an upgrade on a new platform, 10 hours per user for a product switch on the same platform and 15 hours per user for a product switch involving a new platform.

Cost analysis worksheet

Use this worksheet and text to determine the hidden costs of switching software standards

1 Cost of application training	
Cost to develop and reproduce course materials (plus)	
Cost of lost employee productivity time while employees are in class (plus)	+
Cost of trainer's time (plus)	+
Cost of outside training (including tuition and travel)	+
Total	

2 Cost of increased support	
Cost of normal support (multiplied by)	
Change factor (see text)	x
Total	

3 Cost of product testing	
Cost of personnel for the number of hours spent testing	
Total	

4 Cost of administration	
Cost of personnel for the number of hours spent on administrative tasks	
Total	

5 Cost of file conversion	
Number of files to convert (multiplied by)	
Conversion time per file (multiplied by)	x
Cost of personnel	x
Total	

6 Cost of custom development	
Cost of the developer's time	
Total	

7 Cost of lost productivity	
Number of users (multiplied by)	
Number of hours in the change factor (see text) (multiplied by)	x
Cost of employee time	x
Total	

Total	
Add the totals of 1 through 7 to get the full implementation cost of switching software standards	

Buy. Sell. Lease.

DEMPSEY. WHERE IBM® QUALITY IS SECOND NATURE.

• RS/6000
• SERIES/1
• SYSTEM 36/38
• 9370
• INDUSTRIAL PC
• ES/9000
• AS/400

BUY–LEASE–SELL
• Processors
• Peripherals
• Upgrades

For preleased equipment, flexible financing, configuration planning, technical support and overnight shipping call

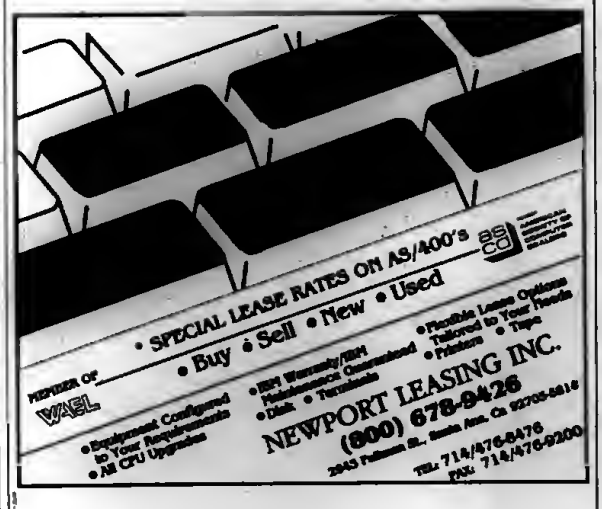
(800) 888-2000.

Dempsey BUSINESS SYSTEMS
Where IBM Quality Is Second Nature

18377 Beach Blvd., Suite 323 • Huntington Beach, CA 92648 • (714) 847-8486 • FAX (714) 847-3149

IBM Authorized Dealer/Lessor Program Integrator

IBM is a registered trademark of International Business Machines Corporation.



Buy • Sell • Lease

Buy • Sell • Rent • Lease

New & Used -

- *Computers*
- *Peripherals*
- *Upgrades*

SPECTRA

(800) 745-1233 (714) 970-7000 (714) 970-7095 Fax

Anaheim Corporate Center

5101 E. La Palma Ave., Second Floor, Anaheim, CA 92807

Buy/Sell/Trade
Data General
MV and AVION Systems and All Peripherals
RAID Disk Systems by EMPerbor
Compatible with: Data General, SUN, HP, Novell & many others.
International Computing Systems
(800) 522-4272
Fax (612) 936-3500

WE BUY

- HP 9000
- Data General
- RS/6000
- Data Products
- PC's Workstations

...AND WE SELL IT TOO!

(617) 982-9664
FAX (617) 871-4456

YOUR **RISC SYSTEM/6000** SOURCE

DATATREND CDLA

HARDWARE
MIGRATION
ENGINEERING SERVICES
ENTERPRISE SERVICES

- Systems, Processors, Peripherals, Upgrades, Parts
- Turnkey Conversion, Emulation, Data Transfer, AIX Support, Application Re-Engineering
- Consolidation Services, Cable Systems, Field/Technical Services, Refurb/Packing Services
- Enterprise-wide Planning, Complex Systems Integration, DAE and RDBMS Incorporation

RISC SYSTEM/6000
SERIES/1 (We're still the leader!)
SYSTEM 36/38
AS/400
937X, 4300, 468X
PS/2, INDUSTRIAL PC

BUY • SELL • LEASE

Call for a complete listing of products and services provided

1-800-*FOR-RISC*

612-942-9830

10250 Valley View Rd., Suite 149, Eden Prairie, MN 55344

Executive Infosource!

LARGE INVENTORY INCLUDING:

9221/120 9221/150
9221/130 Extensive stock of features

Call us for your 9370/9221 needs.

Executive Infosource!

Offering full service technical support.

CDLA 708 215-9370

Fax 708 215-9992

REFURBISHED USED

- UPS SYSTEMS
- STANDBY GEN SETS
- LIEBERT A/C
- ACCESS FLOORING

262 S. Military Trail
Deerfield Beach, FL 33442

1-800-226-0784
305-425-0638

Short Term Rentals on all New & Used Essential Equipment

Call for the Most Competitive Prices

CSI
Computex Systems, Inc.
83 Eastman Street
Easton, MA 02334

1 800-426-5499
In MA: (508) 230-3700
Fax: (508) 238-8250

Product Classified Pages
Where America's Computer Professionals Shop
(800) 343-6474
(In MA; 508/879-0700)

It's the *PRODUCT CLASSIFIED PAGES*
Reach Computer Professionals Where They Shop For:

- ☐ Buy/Sell/Lease
- ☐ Software
- ☐ Communications
- ☐ Time/Services
- ☐ Conversions
- ☐ Training/Education
- ☐ Solutions Directory
- ☐ Hardware
- ☐ Peripherals/Supplies
- ☐ Graphics/Desktop Publishing
- ☐ Bids/Proposals/Real Estate
- ☐ Business Opportunities
- ☐ Used Equipment Listings

CALL NOW!
(800) 343-6474
(In MA., 508/879-0700)

COMPUTERWORLD
Where computer buyers meet computer sellers. Every week.

629,000 IS/DP Professionals see the

Product Classified Pages

each week. Call for advertising information:

(800) 343-6474

Bids • Proposals • Real Estate

NOTICE OF REQUEST FOR PROPOSAL (RFP)

The Port of Los Angeles is hereby soliciting proposals for the development of an Information Strategic Plan (ISP) for the Port. Firms having interest in performing this work should contact the Port as soon as possible to obtain a copy of the RFP. For a copy, please contact Ms. Dora McClendon at 310-732-3795. Responses to the RFP must be received by the Port no later than 4:30 p.m., July 19, 1993.

Inquiries regarding the RFP should be addressed to:

Mr. Stan Johnson
Director
Management Information Systems
Port of Los Angeles
P.O. Box 151
425 So. Palos Verdes Street
San Pedro, CA 90733-0151
Telephone: 310-732-3780
Fax: 310-519-7901

It is the policy of the Port of Los Angeles that minority - and women-owned enterprises shall have the maximum ability to participate in the Port's business opportunities. All such firms are encouraged to respond to this Notice

---

MS CENTRAL DATA PROCESSING AUTHORITY

Sealed proposals will be received by CDPA, 301 N. Lamar St., 301 Bldg., Suite 508, Jackson, MS 39201 for the following:

RFP 2431 due Thurs 7/1/93 at 3:30 pm for a grants management software package for the DEPT. OF REHABILITATION SERVICES. No Charge.

RFP 2435 due Wed 7/14/93 at 3:30 pm for a turnkey system on which to host software and operations mandated by the Social Security Administration Baseline Automation directive for the DEPT. OF REHABILITATION SERVICES. No Charge

RFP 2434 due Thurs 7/15/93 at 3:30 pm for a turnkey local area network with intelligent workstations, peripherals and software to provide access to a host departmental processor running Social Security Baseline applications for the DEPT. OF REHABILITATION SERVICES. No Charge

RFP 2435 due Wed 7/7/93 at 3:30 pm for a master maintenance contract on existing microcomputer equipment for CENTRAL DATA PROCESSING AUTHORITY. Charge $10.00.

A written request with correct payment only for RFPs with a charge. No phone requests. Corporate checks on a MS bank, certified check or POSTAL money order made out to CDPA. No cash or out-of-state checks. RFPs with no charge call Kelli Brown @ 601-359-2604. Pick up RFPs at CDPA between 1:00-3:00 p.m. only. CDPA reserves the right to reject any/all bids and to waive informalities.

It's the *Product Classified Pages*

Reach Computer Professionals Where They Shop For:

- ☐ Buy/Sell/Lease
- ☐ Conversions
- ☐ Hardware
- ☐ Software
- ☐ Communications
- ☐ Time/Services
- ☐ Training/Education
- ☐ Solutions Directory
- ☐ Peripherals/Supplies
- ☐ Business Opportunities
- ☐ Used Equipment Listings
- ☐ Graphics/Desktop Publishing
- ☐ Bids/Proposals/Real Estate

(800) 343-6474
(In MA., 508/879-0700)

Education & Training

JAMES MARTIN WORLD SEMINAR

"The Computer Industry's Most Valuable Seminar"
(Days 1-3)
Dr. Carma McClure's Software Reuse Engineering Seminar
(Days 4-5)

BOSTON	SF
May 3-7	May 10-14

CHICAGO May 24
Dr. Martin's Two Day Senior Management Seminar on Enterprise Engineering (Limited Enrollment)

ATLANTA	CHICAGO
June 21-25	Sept. 13-17
WASHINGTON	L.A.
Oct. 18-22	Nov.1-5

ORLANDO
"Disney World"
Dec. 6-10

EXTENDED INTELLIGENCE, INC.
Phone: (312) 346-7090
Fax: (312) 372-7762

Application Development for Cross Platform Execution

Learn how to use one application development CASE tool to develop sophisticated, industrial strength applications to run on AS/400, Unix, mainframes, client/server and much more!

Whether you're trying to build a new application, installing a CASE-enabled application, or rightsizing off a mainframe, Synon tools give you the choice of platform to execute on.

FREE Half Day Seminars (Limited Enrollment)

DALLAS	SF	PHILADELPHIA
June 22	June 22	June 23
TORONTO	COSTA MESA	NEW YORK
June 23	June 24	June 24
ATLANTA	MINNEAPOLIS	PORTLAND
June 29	June 30	July 1

SYNON

HIGH STAKES SEMINAR SERIES

Ph: 800-667-9666 or 415-461-5000 ; Fax: 415-461-4730

COMPUTERWORLD
Product Classified Pages
delivers your message to companies that plan to buy your product or service.

From PCs to minis, mainframes to supercomputers, *Computerworld's* readers buy products across all ranges of today's computers. So if you're selling, advertise in the newspaper that delivers readers that plan to buy YOUR product or service. Advertise in *Computerworld's Product Classified Pages!*

For more information, call:
(800) 343-6474
(in MA, 508/879-0700)

LEARN OBJECT TECHNOLOGY

"Concepts & Applications"
SMALLTALK & C++

DON'T "Get Lost in the Hierarchy"

DO Participate in an Intensive 5-Day Introductory Course by ***RWI***

*Roth Weil International, **RWI***
Achieves Excellence in TRAINING

(800) 258-0541 or (713) 660-8060

PRODUCT CLASSIFIED PAGES

Where America's Computer Professionals Shop

(800) 343-6474
(in MA; 508/879-0700)

Computing OUTSOURCING

...a charge to the Buyer, because our fee is paid by the Seller.

We broker COMPUTER TIME and SERVICES on ALL platforms.

Since 1968 we have found your LOWEST prices from over 2000 nationwide data centers.

Call Don Seiden at:

COMPUTER RESERVES, INC

800 882-0988 (201) 882-9700

OUTSOURCING

REMOTE COMPUTING

Extensive Software Library

Telenet Tymnet
Searsnet IBM Information Network

Extraordinary Customer Service
Migration Management

CICS
TSO
FOCUS
ICCF

GLS INFORMATION SYSTEMS, INC.

...Alaska for mainframe computing services.

...Drive, Oak Brook, IL 60521 708-574-3636

Cleveland 216-885-5080 New England 617-595-9000

COMPUTERWORLD

Product Classified Pages

Examine the issues while computer professionals examine your message.

Call for all the details.

(800) 343-6474
(In MA., 508/879-0700)

Every vendor

on this page has a well-equipped data center.

We all have large systems plenty of MIPS, and UPS systems with the software you need

ONLY ONE WILL EXCEED YOUR EXPECTATIONS

Only one runs your work as their own, Only one minimizes your risk and maximizes your cash flow, Only one will get the job done totally

YOU'RE IN CONTROL WHEN YOU PUT US IN CONTROL

CSC

Dedicated to Outsourcing since 1980

CSC CompuSource
A Company of Computer Sciences Corporation

110 MacKenan Drive
Cary, North Carolina 27511
919. 481 9341

Product Showcase

Do your users know which button to push?

Custom computer keys printed with color-coded software commands reduce keyboarding errors and eliminate time lost searching for commands in manuals, help screens and pull-down menus!
Improve Data Entry Accuracy • Cut Training Costs

Hooleon Corp.
Dept. COMW, 200 Justin Dr.
Cottonwood, AZ 86325

Free Catalog
800 937-1337
Fax: 602-634-4620

WITT Development Team

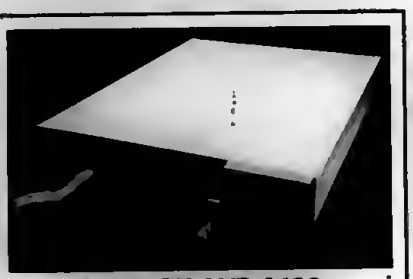
WITT 2.1 for faster, more reliable testing.

The **Workstation Interactive Test Tool (WITT)** development team wants to take the worry out of your application testing. **WITT 2.1** helps you test MVS, VM, OS/400® and OS/2® applications. The OS/2 GUI interface gets you started right away with automatic record, playback and compare facilities.

For a FREE evaluation demo, call today.

1 800 426-3346, ext. STL29 IBM

An AD/Cycle® product from Programming Systems/Santa Teresa Laboratory



9-TRACK AND 3480

Rock solid solutions, rock bottom prices.
For PCs and workstations • 3480 Now With IDRC!

Exchange data with mins & mainframes - Reliable, lightweight, compact, 1600 and 6250 bpi 9-track solutions manufactured by Overland Data - PC solutions include the latest Overland Data controllers and DOS software - Many workstation platforms are supported too. Call 7 am - 5 pm Pacific Standard Time.

OVERLAND DATA. **800-729-8725**
San Diego, CA · Since 1980 619-571-5555 · Fax: 619-571-0982
EUROPE: (+49) 6172-35027 · Fax: (+49) 6172-35028

Custom Keyboards . . .
. . . For Custom Applications

- Custom Key Caps, Legends, Colors and Housings
- Custom Cables and Connectors
- Integrated Bar Code and Mag Card Readers
- Iso Point® Pointing Device
- Sun Compatible Keyboards
- Engineering, Development and Production
- Low Volume, Quick Turnaround and Prototypes
- 3 Year Limited Warranty

SOLUTIONS FOR YOUR SYSTEM INTEGRATION NEEDS

KeySource International
Division of United Plastics Corporation
2391 American Avenue
Hayward, CA 94545

PARTNERS IN QUALITY CUSTOMER

TEL. 510-783-6066
800-722-6066 FAX 510-783-2993

ALICOMP, INC.

The "Boutique" of the Computer Services World

VM, MVS, VSE
Outsourcing/Timesharing/Consulting
Remote and On Site

Two *State of the Art* Locations
20,000 sq. ft. Manhattan complex
100,000 sq. ft. Secaucus, NJ complex

"Our Platform is Excellence"

Serving Clients Since 1980

(212) 886-3600 • (800) 274-5556

COMPUTERWORLD

Product Classified Pages give you buyers with extensive purchase influence.

In fact, o full 95% ore involved in purchase decision making for their organizations. They determine needs, evaluate technologies, identify solutions, and select products and vendors for the entire range of information systems, os well os related products and services.

So if you're selling computer products ond services, advertise in the newspaper that delivers buyers with volume purchasing influence. Advertise in *Computerworld's Product Classified Pages!*

For more information, call (800) 343-6474
(in MA, 508/879-0700)

COMPUTERWORLD
PRODUCT CLASSIFIED
Where computer buyers meet computer sellers. Every week.

Solutions Directory

• Consultants • Value Added Resellers • Marketing Partners • OEMs • Systems Integrators • Distributors

To list your company so that Computerworld's readers can contact you directly, dial 800/343-6474, x744. Basic company listings will appear 26 consecutive weeks for just $499.

4GL

CompuSolve Associates
River Edge, NJ ..... (800) 847-6583
OMNItech Consulting Services, Inc.
Edison, NJ ..... (908) 225-5577

ACCTG SOFTWARE/SERVICES

Arthur Ellingsen & Co.
Arlington Heights, IL ..... (708) 506-0555
Beacon Application Services Corp.
S. Natick, MA ..... (508) 651-9923
Myers-Holum, Inc.
New York, NY ..... (212) 753-5353
OPEN SYSTEMS® Accounting Software
Open Systems Holdings Corp. (800) 328-2276
Origin Technology in Business
Columbus, OH ..... (614) 431-2345
Phase 2 Consulting, Inc.
Cumberland, RI ..... (401) 333-4536

APPLICATIONS DEVELOPMENT

Avalon Engineering, Inc.
Boston, MA ..... (617) 247-7668
James Borta & Associates
Hoffman Estates, IL ..... (708) 882-1301
Claremont Consulting Group, Inc.
Beaverton, OR ..... (800) 441-1002
CompuSolve Associates
River Edge, NJ ..... (800) 847-6583
ISA Consultants
Chicago, IL ..... (800) 462-6301
MICS Applied Concepts, Inc.
New York, NY ..... (212) 732-7452
Origin Technology in Business
Columbus, OH ..... (614) 431-2345
Rocajam
Atlanta, GA ..... (404) 612-0374

AUTOMATION AND CONTROL

Concept XXI, Inc.
Cleveland, OH ..... (216) 631-2121

BANKING/FINANCIAL

Origin Technology in Business
Columbus, OH ..... (614) 431-2345

BAR CODE/DATA COLLECT SYS

Sentinel Business Systems, Inc.
Milford, CT ..... (203) 874-3199

C

Decision Software Systems
Willow Grove, PA ..... (800) 682-0794

CABLING SERVICES

Nationwide, 250+ Local Service Locations
Premises One LAN SERV ..... (800) LAN-SERV

CASE

Integrated Software Specialists
Schaumburg, IL ..... (708) 240-5070

CLIENT SERVER DEVELOPERS

ACR Inc. (PowerBuilder VAR)
New York, NY ..... (212) 629-3370
R.M. Boerma, Inc.
Hazleton, PA ..... (717) 454-8159
Client Server Systems, Inc.
Wellesley, MA ..... (617) 239-8065
Lmc Systems Consulting & Training
Bloomfield, CT ..... (203) 286-9060
Logic Plus Open Systems, Inc.
Northbrook, IL ..... (708) 559-9697
PowerCerv (PowerBuilder VAR)
Tampa, FL ..... (813) 281-2990
SHL Systemhouse
Chicago, IL ..... (312) 939-0099
SPECTRUM ASSOCIATES
Woburn, MA ..... (617) 932-0932
The Ultimate Corporation
Hanover, NJ ..... (201) 887-1000

WATERFIELD: PowerBuilder Sales & Consulting
Lexington, MA ..... (617) 863-8400
Zeitech, Inc.
Stamford, CT ..... (203) 359-9807

COMMUNICATIONS

Decision Software Systems
Willow Grove, PA ..... (800) 662-0794

CONTRACT PROGRAMMING

Informix/Oracle/Ingres/Sybase/Unix
Atlanta, GA ..... (800) 264-6686
ADA/NAT, INC.
Tacoma, WA ..... (206) 927-1219
Alliance Consulting Group, Inc.
McLean, VA ..... (703) 243-6979
T.J. Brady & Associates
Sommerville, NJ ..... (908) 359-0236
Jerry Cohen & Associates
Portland, OR ..... (503) 289-7706
Comsys Technical Services, Inc.
Rockville, MD ..... (301) 921-3600
Decision Software Systems
Willow Grove, PA ..... (800) 683-0794
DGS Electronics
Albany, NY ..... (516) 869-1305
ISDN Corson, Inc.
Roslyn Heights, NY ..... (516) 265-0341
TechniSource, Inc.
Ft. Lauderdale, FL ..... (305) 493-8601
Quatrx, Inc.
St. Louis, MO ..... (314) 434-6655

CUSTOMER SERVICE

The Help Desk, Inc.
Phoenix, AZ ..... (602) 460-1926
SPECTRUM ASSOCIATES
Woburn, MA ..... (617) 932-0932

DATA CONVERSION

Data Conversion, Inc.
Minneapolis, MN ..... (612) 525-0649

DATA CTR DESIGN/MGMT

21st Century Innovations, Inc.
Aliso Viejo, CA ..... (800) 327-4627
Booz Allen & Hamilton
NY, NY ..... (212) 697-1900
Condor Consulting Ltd.
Chicago, IL ..... (312) 751-8654
DataWright, Inc.
Westmont, IL ..... (800) 377-3191

DBMS

Advanced Data Management (800) 992-4377
Document DATABASE Tool for the Professionals. We have VAR and Dist. programs available. Call/Write 15 Main St. Kingston, NJ 08528

Business Application Developers, Inc.
Anchorage, AK ..... (907) 562-5646
CompuSolve Associates
River Edge, NJ ..... (800) 847-6583
On-Line Systems Group
St. Petersburg, FL ..... (800) 322-5265

DISASTER RECOVERY

Computer Security Consultants, Inc.
Ridgefield, CT ..... (800) 925-2724
Advanced Information Management (703) 643-1002
Woodbridge, VA FAX ..... (703) 643-2722
Recovery Management, Inc.
REXSYS® Software ..... (800) RMI-8866
Strobl Systems
LDRPS Software ..... (800) 634-2016

EDUCATION & TRAINING

Berard Software Eng., Inc. (301) 417-8684
Specializing in object-oriented consulting, training and products. For more information call/write Berard Software Engineering Inc., 101 Lakeforest Blvd., Ste. 360, Gaithersburg, MD 20877

IS Training Services (508) 838-9019
Specializing in providing on-demand educational consulting services and training solutions designed to support the entire IS function - including the clients of IS. For more information contact Boy-Tan & Associates, 5 Old Meadow Ln., Acton, MA 01720. Call now!

Carl A. Argila, Ph.D., Inc.
Los Angeles, CA ..... (800) 347-6903
MIS Training Institute (508) 879-7999
FAX ..... (508) 872-1153
National Education Training Group, Inc.
Naperville, IL ..... (708) 369-3000
Object Oriented Preparation Services, Inc.
Robbinsville, NJ ..... (609) 259-0601

ELECTRONIC DATA INTERCHANGE

DNS Associates, Inc.
Burlington, MA ..... (800) 624-6354
EDI Able, Inc.
Malvern, PA ..... (215) 993-0813
Integrated Software Specialists
Schaumburg, IL ..... (708) 240-5070

ENTERPRISE RESOURCE PLNG

FOURTH SHIFT CORPORATION (JIT)
Minneapolis, MN ..... (800) 433-2467

EXPERT SYSTEMS

FOUNDATION TECHNOLOGIES, INC.
Boston, MA ..... (617) 720-2760
OXKO Corporation
Anapolis, MD ..... (410) 266-1671

FOCUS

FOCAL SYSTEMS, INC.: Focus Consulting
Seattle, WA ..... (206) 788-4467

GOV'T/MUNICIPALITIES

Arthur Ellingsen & Co.
Arlington Heights, IL ..... (708) 506-0555
IDC, Inc.
Chicago, IL ..... (312) 464-1020

GROUP WARE/E-MAIL

ACR Inc.(Lotus Notes VAR)
New York, NY ..... (212) 629-3370

GUI FRONT ENDS

WATERFIELD: PowerBuilder Sales & Consulting
Lexington, MA ..... (617) 863-8400

HEALTH CARE

Systems Resources Corp
Burlington, MA ..... (617) 270-9228

HELP DESK

The Help Desk, Inc.
Phoenix, AZ ..... (602) 460-1926

HUMAN RESOURCE SOFTWARE

SPECTRUM Human Resource Systems Corporation
Denver, CO ..... (800) 334-5660

HUMAN RESOURCE SYSTEMS

PC/LAN Personnel, Benefit, and HR Systems
STS, Inc. Rolling Meadows, IL ..(800) 227-2729

INSURANCE

Programming Resources Company
Hartford, CT ..... (203) 728-1428

IMAGING

Avalon Engineering, Inc.
Boston, MA ..... (617) 247-7668
Burns Consulting Group
Scituate, MA ..... (617) 982-1868
Grumman InfoConversion
Hollsville, NY ..... (516) 737-7188
Imaging Expo, NY
Sept. 28-30 ..... 800 44-IMAGE
United Systems and Software, Inc.
Maitland, FL ..... (407) 875-2120

MANUFACTURING

Expandable Software, Inc.
Santa Cruz, CA ..... (408) 261-7880
SPECTRUM ASSOCIATES
Woburn, MA ..... (617) 932-0932

MANUFACTURING SOFTWARE

Effective Management Systems
Milwaukee, WI ..... (414) 359-9800
Intrepid Software, Inc.
Burlington, MA ..... (617) 273-2920
North Coast Automation, Inc.
Cleveland, OH ..... (216) 473-3800
Man-Trak® - Management Tracking System
Open Systems Holdings Corp. (800) 328-2276

NETWORKING

A-net
Eugene, OR ..... (800) 444-9796

OUTSOURCING

Advanced Data Management (800) 934-3772
A full service system integrator. Design through implementation, all major databases and tools. Call/Write 15 Main St. Kingston, NJ 08528

PAYROLL SYSTEMS

PC/LAN Payroll, HR, and Tax Systems
STS, Inc. Rolling Meadows, IL ..(800) 227-2729

PRODUCTIVITY

Koch Productivity Consulting
Bel Air, MD ..... (410) 838-8721
Productivity Management Group, Inc.
East Amherst, NY ..... (716) 689-7724

SALES FORCE AUTOMATION

Gateway Systems Corporation
East Lansing, MI ..... (800) 333-9366

SCHEDULING/PLANNING

Summit Solutions, Inc.
Chesterton, IN ..... (219) 929-4189

SECURITY

Phase 2 Consulting, Inc.
Cumberland, RI ..... (401) 333-4536
RSH Computing, Inc.
Newton, MA ..... (617) 969-9050
Z-Lock Mfg. Co.
Redondo Beach, CA ..... (310) 372-4842

SOFTWARE FOR SCHOOLS

Matrix Computer Systems, Inc.
Milwaukee, WI ..... (414) 541-3028

SPEECH INTEGRATION

Zeitech, Inc.
Stamford, CT ..... (203) 359-9807

STORAGE MGMT SOFTWARE SVCS

Adept
Riverside, CA ..... (909) 688-7012

TRANSPORTATION SOFTWARE

KCI/The Traffic Manager
Ft. Lauderdale, FL ..... (305) 567-2270

UTILITIES

OASIS Technology, Inc.
Oxnard, CA ..... (805) 988-1020

WHOLESALE DISTRIBUTION

Arthur Ellingsen & Co.
Arlington Heights, IL ..... (708) 506-0555
ADD+ON® Software Advantage/V
Open Systems Holdings Corp (800) 328-2276

See How IT Works

Enterprise '93

• World Trade Center
Boston

Why do some companies struggle with their Information Technology (IT) resources, while others have utilized IT to propel them far beyond their competitors? What roadblocks have the successful companies met and surpassed in their quest to maximize their use of IT?

See IT At Work.

Come to Enterprise '93, June 16-18, at the World Trade Center in Boston and you can see and talk to the people and companies that "made IT happen" for them. See how Met Life empowered its workforce and maximized productivity in the field. Or how Pittsburgh Plate and Glass streamlined distribution and accelerated customer service. All because of IT . . . and innovative thinking. And, because the European Community is a participant in Enterprise '93, you'll get an inside look at how Europe is meeting the productivity challenge.

Hear How IT Works.

Enterprise '93 also features over 30 conference sessions that show you how information technology can be woven into your company's strategic goals to increase productivity and profitability.

Make IT Work For You.

Find out for yourself how IT works at the Enterprise '93 Showcase and Conference. We promise, you'll take home knowledge and insights you can put to work immediately in your enterprise.

For More Information on IT:

Call the Enterprise '93 hotline: **800/225-4698 or 508/879-6700.**

C14

Enterprise '93 is co-hosted by the Massachusetts Institute of Technology, the Open Software Foundation and Bull Worldwide Information Systems

With participation by the European Community

Enterprise '93 co-sponsors:

SCO · GartnerGroup · INFORMIX · Andersen Consulting · ORACLE · Computer Intelligence · Ingres · INTEGRIS · COMPUTERWORLD · ZENITH DATA SYSTEMS · SAP · Microsoft · 3Com

SALES OFFICES

Associate Publisher/Senior Vice President Sales
Kevin McPherson

Computerworld Headquarters: 375 Cochituate Road, P.O. Box 9171, Framingham, MA 01701-9171 Phone: 508-879-0700, FAX: 508-879-0446

BOSTON: Vice-President Eastern Advertising Sales/David Peterson, Sr. District Managers/Bill Cadigan, Sherry Driscoll, District Manager/John Watts, Sales Assistants/Alice Longley, Lisa Reis, Linda Clinton, COMPUTERWORLD, 375 Cochituate Road, Box 9171, Framingham, MA 01701-9171 (508) 879-0700 FAX: (508) 872-2515

CHICAGO: Vice-President Eastern Advertising Sales/David Peterson, COMPUTERWORLD, 1011 East Touhy Avenue, Suite 550, Des Plaines, IL 60018 (800) 343-6474

NEW YORK: Senior District Manager/Fred LoSapio, District Managers/Paula D'Amico, Rich Molden, Sales Assistants/Susan Kusnic, Jean Dellarobba, COMPUTERWORLD, Mack Center 1, 365 West Passaic St., Rochelle Park, NJ 07662 (201) 587-0090 FAX: (201) 712-9786

LOS ANGELES: Southwestern Regional Manager/Fran Cowen, Sales Assistant/Judi Taylor, COMPUTERWORLD, 18008 Sky Park Circle, Suite 145, Irvine, CA 92714 (714) 261-1230 FAX: (714) 250-4881

SAN FRANCISCO: Vice-President Western Advertising Sales/Richard Espinoza, Executive Assistant/Leticia Linhares, Senior District Managers/Ernie Chamberlain, Kaye Sharbrough, District Managers/Michele Gerus, Sharon B. O'Brien, Sales Assistants/Candace Salvato, Michelle Beals, Emily Gaytan, Sunnie Scarlett, COMPUTERWORLD, 500 Airport Boulevard, Suite 400, Burlingame, CA 94010 (415) 347-0555 FAX: (415) 347-6312

ATLANTA: Senior District Manager/Bernie Hockenberger, Sales Assistant/Debra Brown, COMPUTERWORLD, 1400 Lake Hearn Drive, Suite 330, Atlanta, GA 30319 (404) 394-0758 FAX: (404) 255-9123

DALLAS: Southeastern District Manager/Darren Ford, Sales Assistant/Brenda Shipman, COMPUTERWORLD, 14651 Dallas Parkway, Suite 304, Dallas, TX 75240 (214) 233-0882 FAX: (214) 385-1603

WASHINGTON, D.C.: District Manager/Rich Molden, COMPUTERWORLD, Mack Center 1, 365 West Passaic St., Rochelle Park, NJ 07662 (201) 587-0090 FAX: (201) 712-9786

CUSTOM PUBLICATIONS:

Vice President/Larry Craven, Director of Publishing Services/Carolyn Novack, Sales Assistant/Heidi Schlueberban, FAX: (508) 879-0446

CLASSIFIED ADVERTISING SALES:

Vice President/Classified Advertising/John Corrigan, Marketing Director/Derek E. Hultsky, 375 Cochituate Rd., Framingham, MA 01701-9171 (800) 343-6474, In MA (508) 879-0700

PRODUCT CLASSIFIED ADVERTISING:

Northeast/Great Lakes: Account Manager/Paul Bourassa, 375 Cochituate Rd., Framingham, MA 01701-9171 (800) 343-6474, In MA (508) 879-0700

South: Senior Account Executive/Jay Novack, 375 Cochituate Rd., Framingham, MA 01701-9171 (800) 343-6474, In MA (508) 879-0700

West: Sales Supervisor/F. Jay Sewell, 375 Cochituate Rd., Framingham, MA 01701-9171 (800) 343-6474, Ext. 384, In MA (508) 879-0700

RECRUITMENT ADVERTISING SALES OFFICES:

New England: Regional Manager/Nancy Percival, 375 Cochituate Rd., Framingham, MA 01701-9171 (800) 343-6474, In MA (508) 879-0700. Account Executive/Karen Lesko, (508) 343-6474, In MA (508) 879-0700

Mid-Atlantic: Regional Manager/Valerie Gallo, Mack Center 1, 365 West Passaic St., Rochelle Park, NJ 07662 (201) 587-0090, Account Executive/Caryn Obst, (800) 343-6474

South-Atlantic: Regional Manager/Katie Arens, 8304 Professional Hill Drive, Fairfax, VA 22031 (703) 573-4115, Sr. Account Executive/Pauline Smith (800) 343-6474

Midwest: Regional Manager/Pat Power, 1011 East Touhy Avenue, Suite 550, Des Plaines, IL 60018 (708) 827-4433, Sr. Account Executive/Ellen Cross (800) 343-6474

West: Regional Manager/Barbara Murphy, 18008 Skypark Circle, Ste. 145, Irvine, CA 92714 (714) 250-0164, Sr. Account Executive/Christopher Glenn (800) 343-6474

DIRECT RESPONSE CARDS:

East: Account Manager/Norma Tamburino, Mack Center 1, 365 West Passaic St., Rochelle Park, NJ 07662 (201) 587-0090

West: Account Executive/Bill Glass, 18008 Skypark Circle, Ste. 145, Irvine, CA 92714 (714) 250-0164

IDG INTERNATIONAL MARKETING SERVICES:

President/Frank Cutitta, Eastern Advertising Manager/Veronique Lamarque, 167 Dalis Road, Framingham, MA 01701 (508) 879-0700

Western Advertising Manager/Ginny Pohlman, 180 Harbor Drive, Suite 215, Sausalito, CA 94965 (415) 332-7571 FAX: (415) 332-0778

Access Media 113-113, 115, 127, 149
Andrew Corp. 25
Apple Computer Corp. 34-35
Applied Business Technology 69-69
AT&T Network Cable Systems 52, 53
Avil Workstations 86
Bachman 69
Banyan 72
Cabletron Systems 40
Cincom Systems 70-71
Clarinet 86-87
Computer Associates 30-31
Compuware 131
Corner Peripherals 42-43, 120
CW Classified 67, 70, 90, 97
CW Maxie 82-83, 94-95, 120
Dell 66-67
Digital Equipment Corp. 22-23, 124-125
EMC Corp. 36
Encore Computer Corp. 101
Enterprise '93 144
4th Dimension 21
Groupware '93 140
Harvard Business School 62
Hayes Microcomputer 44
Hewlett-Packard 18-19, 24, 56, 82
IBM 76-77
IBM Personal Software Products 28-31, 46-47
Information Builders 17
Ingres 98-91
Interalv 130
Knowledgeware 29
Lawson Associates 23
Lexmark 126
Lotus Development Corp. 48
Micro Focus 11
Micropolis 78
Mobile World 41
Momentum/Cuotas 38-39
National Education Foundation 86-87
NEC 84-85
Neuron Data 122-123
Oracle Corp. 3
Ross Systems 16
Sapien 63
SAS Institute 9, 57, 68
Shell Dynamics, an IBM Company 100
Software Engineering of America 64
SunSoft 26-27
Sybase, Inc. 13
Symantec 206
Syncsort 8
Synoptics 76-75
Systems Center 7
3M 120
TGV 39
Unisys 100
WordPerfect Corp. 58-61, 88-89
Wyse Technology 103, 105

This index is provided as an additional service.
The publisher does not assume any liability for errors or omissions.

CW PUBLISHING INC.

An IDG Company: The World's Leader in Information Services on Information Technology

CEO & Publisher
Gary J. Beach

Computerworld Headquarters: 375 Cochituate Road, P.O. Box 9171, Framingham, MA 01701-9171 Phone: 508-879-0700, FAX: 508-875-4394

Bill Laberis	Kevin McPherson	Matthew Smith	Steven F. Wen
Senior Vice-President Editorial	**Associate Publisher Senior Vice President/Sales**	**Senior Vice-President Operations**	**Senior Vice-President Marketing**

PUBLISHER'S OFFICE Executive Assistant to the CEO/Publisher, Karen Elliott. **SALES - DISPLAY Advertising Director,** Carolyn Novack. **Display Advertising Production Manager,** Maureen Hanley. **Display Advertising Coordinators,** Peggy Hennessy, Paula Wright. **SALES - CLASSIFIED Vice President Classified Advertising,** John Corrigan. **Classified Marketing Director,** Derek E. Hultsky. **Classified Operations Director,** Cynthia Delany. **MARKETING Director, Marketing Communications,** Mary Doyle. **Account Manager, Marketing Communications,** Elizabeth Phillips. **Marketing Coordinator & Conventions Project Coordinator,** Sarah Thayer. **Administrative Assistant,** Patty Faherty. **CIRCULATION Vice-President Manager, Trade Show & Conventions,** Audrey Shohan. **Marketing Communications Director,** Cynthia Severance. **Circulation Director,** Carl Odenwald. **Director of Circulation Management,** Maureen Burke. **PRODUCTION Production Director,** Christopher P. Costa. **Production Manager,** Beverly Wolff. **SYSTEMS Vice President Information Systems,** Linda Nelson. **Administrative Sales Assistant,** Lois Bennett.

GLOBAL LEADERSHIP NETWORK

FOREIGN EDITORIAL/SALES OFFICES

ARGENTINA: Ruben Argento, CW Communicaciones S/A, Av. Belgrano 406-Piso 6, CP 1092 Buenos Aires. Phone: (011) 541 342 5583 Telex: (390) 22644 (BAZAN AR) FAX: (011) 541 331 7672

ASIA: S.W. Chan, Asia Computerworld Communications Ltd., 701-4 Kam Chung Bldg., 54 Jaffe Road, Wanchai, Hong Kong. Phone: (011) 852 861 3238 FAX: (011) 852 861 6953

AUSTRALIA: Dan Kennedy, IDG Communications Pty Ltd., 37-43 Alexander Street, Crows Nest, NSW 2065. Phone: (011) 61 2 4395133, Telex: (790) AA74752 (COMWOR) FAX: (011) 61 2 439 5512

AUSTRIA: Manfred Weiss, IDG Communications Verlagsges mbH, Zieglergasse 6, A-1070 Wien Austria. Phone: (011) 43 222 523 14 310, Telex: (847) 115542 (SCH/A) FAX: (011) 43 222 523 09 08 33

BRAZIL: Nay Knust, Computerworld do Brasil Ltda., Praca Floriano, 19/26 Andar, 20031 the de Janeiro, RJ Brasil. Phone: (011) 55 21 240 8228 Telex: (3811) 21 30830 BR Sao Paulo: Computerworld do Brasil Ltda., Rua Joaquim Floriano, 466/3 andar-CEP 04534, Sao Paulo Brasil. Phone: (011) 55 11 852 6536 Telex: (391) 21 30838 (WORD BR) FAX: (011) 55 21 240 7759

COLUMBIA: Clm A. Villate, Computerworld Colombia, Transversal 23 No. 58-26, Airmail Box 54018, Bogata, Colombia. Phone: (011) 571 310 0199 FAX: (011) 572 211 6848.

DENMARK: Preben Engell, IDG Denmark A/S, Nunnatoppen 4 DK-2500 Valby Denmark. Phone: (011) 45 36 442800. Telex: (855) 31886 FAX: (011) 45 36 442033.

FRANCE: Frances Cheuzebrunier, IDG Communications France, Immeuble La Fayette 2, Place des Vosges, Cedex 65, 92051 Paris la Defense, France. Phone: (011) 33 1 4904 7900 Telex: (842) 6132349 FAX: (011) 33 1 4904 7900

GERMANY: Eckhard Utpadel, IDG Communications Verlag AG, Brenstrasse 28/29, Postfach 40 04 29, 8000 Munich 40, Germany. Phone: (011) 49 89 360860. Telex: (841) 5215350. [COMW D]. FAX: (011) 49 89 3 60 86109

HUNGARY: Istvan Biro, IDG Communications Hungary Publisher Ltd., 1018 Budapest, Gellerhegy u. 30-32. Postal address is 1536, Budapest, P.O.B. 366 Hungary. Phone (011) 36 1 156 9122, Telex: (861) 226307 (Kalp H). Fax: (011) 361 3 202 9365.

INDIA: Rohini Khullar, Media Transasia India Ltd., 103 Anand Lok, New Delhi 110049 India. Phone (011) 91 11 644 0110, FAX: (011) 91 11 643 2959.

ITALY: Bonello Bosco, IDG Communications Italia, Via Mecenate 30/14, 20138 Milano, Italy. Phone (011) 39 2 58 01 16 60 Telex: (843) 335318. FAX: (011) 39 2 58 01 16 70.

JAPAN: Jim Powis, IDG Communications/Japan, Kaneko TBR Bldg., 6F, Rm. 616, 5-7 Kajimacho, Chiyodaku, Tokyo 102, Japan. Phone: (011) 81 33 3222 6411 Telex: (781) 252 4217 FAX: (011) 81 33 3222 6566.

MEXICO: Henry Morales, Computerworld Mexico S.A. de C.V., Gonzalez de Cosoo #334, Colonia del Valle, 03100 Mexico D.F. Phone: (011) 52 5 609 6454. Telex: (383) 177 1300 (ACHIAME) FAX: (011) 52 5 688 1140.

THE NETHERLANDS: Raad Bakker, IDG Communications B.V., Schiphorst 1, P.O. Box 5446, 2034 LS/2000 GK Haarlem, The Netherlands. Phone: (011) 31 23 366 814. Telex: (844) 18242 (CWCOM NL) FAX: (011) 31 23 369 184.

NEW ZEALAND: Mardn Taylor, IDG Communications Ltd., 2nd Floor, 15 Augustus Terrace, Parnell, Auckland 1, New Zealand. Phone (011) 64 9 779 902 Fax: (011) 64 9 724 604

NORWAY: Morten Hansen, CW Nedge A/S, Hovervelen 43, 0576, Oso 5, Norway. Phone: (011) 472 647723. Telex: (856) 76476 (CW NOR N). FAX: (011) 47 208 0152.

PEOPLE'S REPUBLIC OF CHINA: Shan Yan, China Computerworld, 74 Lu Ga Road Box 730, Beijing 100039, People's Republic of China. Phone: (011) 861 81 0044. Telex: (716) 222214 (CDW CN) FAX: (011) 861 821 7888.

RUSSIA: Boris Antonnik, Information Computer Enterprise, Prospect Mira 167-49-27, UDNH, pavilion 64, 129223 Moscow, USSR I.C.E. Phone: (011) 709 5 167 6836. Telex: (871) 641 354 FAX: (011) 709 5 158 9460.

SINGAPORE: S.W. Chan, Asia Computerworld Communications 04-07 Parkway Builders Centre, No. 1 Marine Parade Central, Singapore 1544, Republic of Singapore. Phone: (011) 65 345 8383 Telex: (786) RS 37003 (Comwor) FAX: (011) 65 345 7097

SPAIN: Paco Zabala, IDG Communications, S.A., Rafael Calvo 18 4B 28010 Madrid, Spain. Phone: (011) 34 1 319 4094 Telex: (831) 49522 (CW E) FAX: (011) 34 1 319 8104

SWEDEN: Bengt Mannfeldt, CW Communications AB, Sodra Hamnagen 22, S-115 41 Stockholm, Sweden. Phone: (011) 46 8647 0100 Telex: (854) 14904 (MONICW). FAX: (011) 46 8665 3132.

SWITZERLAND: Gebhard Ostenwalder, CW Publikationen AG, Wilhelmsstrasse 19, Postfach 253, CH - 8030 Zurich, Switzerland. Phone: (011) 41 1 55 10 77 Telex: (854) 816710 (CWC CH). FAX: (011) 41 1 55 1235

TAIWAN: Harry Yen, IDG Communications/Taiwan, 16F-8, No. 137, Section 1, Fu Hsin South Road, Sec. 1, Taipei 10636, Taiwan, R.O.C. Phone: (011) 644 2 721 4302 FAX: (011) 886 2 777 5339.

UNITED KINGDOM: Ian Hollingsworth, CW Communications Ltd., 99 Grays Inn Rd., London WC1 8UT, United Kingdom. Phone: (011) 44 71 831 8252 FAX: (011) 44 71 875 0271. Colin Smith, Oliver Smith & Partners, Ltd., 69 Rotherville Mews, 96 Clapham Park Road, London SW4 7BX, United Kingdom. Phone: (011) 44 71 978 1440 FAX: (011) 44 71 978 1090.

VENEZUELA: Rolman van Voms Nedg, IDG Communications C.A., Torre Maracaibo, Piso 13, Oficina 'A' Av. Libertador, Caracas, Venezuela. Phone: (011) 58 2 72 76 30. FAX: (011) 58 2 724970.

INTERNATIONAL DATA GROUP

Patrick J. McGovern	Walter Boyd	William P. Murphy	Robert Farmer
Board Chairman	**President**	**Vice President/Finance**	**Vice Chairman**

Computerworld is a publication of International Data Group, the world's largest publisher of computer-related information and the leading global provider of information services on information technology. International Data Group publishes over 190 computer publications in 80 countries. Thirty million people read one or more International Data Group publications each month. International Data Group's publications include: ARGENTINA'S Computerworld Argentina, Infoworld Argentina; ASIA'S Computerworld Hong Kong, PC World Hong Kong, Computerworld Southeast Asia, PC World Singapore, Computerworld Malaysia, PC World Malaysia; AUSTRALIA'S Computerworld Australia, Australian PC World, Australian Macworld, Reseller, IDG Sources; AUSTRIA'S Computerwelt Oesterreich, PC Test; BRAZIL'S Computerworld, Mundo IBM, Mundo Unix, PC World, Publish; BULGARIA'S Computerworld Bulgaria, Ediworld, PC World Bulgaria; CANADA'S Direct Access, Graduate Computerworld, InfoCanada, Network World Canada; CHILE'S Computerworld, Informatica; COLOMBIA'S Computerworld Columbia; CZECH REPUBLIC'S Computerworld, Elektronika, PC World; DENMARK'S CAD/CAM WORLD, Communications World, Computerworld Denmark, Computerworld Focus, Computerworld Uddannelse, LOTUS World, Macintosh Produktkatalog, Macworld Denmark, PC World Denmark, PC World Produktguide, Windows World; ECUADOR'S PC World; EGYPT'S PC World Middle East; FINLAND'S Mikro PC, Tietoviikko, Tietoverkko; FRANCE'S Distributique, GOLDEN MAC, InfoPC, Languages & Systems, Le Guide du Monde Informatique, Le Monde Informatique, Telecoms & Reseaux; GERMANY'S Computerwoche, Computerwoche Focus, Computerwoche Extra, Computerwoche Karriere, edv aspekte, Information Management, Macwelt, Netzwelt, PC Welt, PC Woche, Publish, Unix; HUNGARY'S Computerworld SZT, PC World; INDIA'S Computers & Communications; ISRAEL'S Computerworld Israel, PC World Israel; ITALY'S Computerworld Italia, Lotus Magazine, Macworld Italia, Networking Italia, PC World Italia; JAPAN'S Computerworld Japan, Macworld Japan, Sunworld Japan; KENYA'S East African Computer News; KOREA'S Computerworld Korea, Macworld Korea, PC World Korea; MEXICO'S Compu Edicion, Compu Manufacturing, Computacion/Punto de Venta, Computerworld Mexico, MacWorld, Mundo Unix, PC World, Windowsy; THE NETHERLAND'S Computer Totaal, LAN Magazine, MacWorld Magazine; NEW ZEALAND'S Computer Listings, Computerworld New Zealand, New Zealand PC World; NIGERIA'S PC World Africa; NORWAY'S Computerworld Norge, C/World, Lotusworld Norge, Macworld Norge, Networld, PC World Ekspress, PC World Norge; PC World's Produkt Guide, Publish World, Student Data, Unix World, Windowsworld; IDG Direct Response, PANAMA'S PC World; PERU'S PC World; PEOPLE'S REPUBLIC OF CHINA'S China Computerworld, PC World China, Electronics International; IDG HIGH TECH BEIJING'S Electronics New Product World; IDG SHENZHEN'S Computer News Digest; PHILIPPINE'S Computerworld, PC World; POLAND'S Computerworld Poland, PC World/Komputer; PORTUGAL'S Macin, Mundo Unix, PC World; PUERTO RICO'S PC World; ROMANIA'S Info Bucuresti; RUSSIA'S Computerworld-Moscow, Mir PC, Sety; SLOVENIA'S Monitor Magazine; SOUTH AFRICA'S Computing S.A.; SPAIN'S Amiga World, Amstrad World, Communicaciones Espana, Communicaciones World, Macworld Espana, PasoDOBLE, PC World Espana, Publish, Sunworld; SWEDEN'S Attack, Computer Sweden, Corporate Computing, Lokala Natverk/LAN, Lotus World, MAC&PC, Macworld, Natverksnytt, PC World, Publishing & Design (CAP), Datalogsparen, Max Data, Windows World; SWITZERLAND'S Computerwelt Schweiz, Macworld Schweiz, PC & Workstation; TAIWAN'S Computerworld Taiwan, Global Computer Express, PC World Taiwan; THAILAND'S Thai Computerworld; TURKEY'S Computerworld Monitor, Macworld Turkiye, PC World Turkiye; UNITED KINGDOM'S Lotus Magazine, Macworld, Sunworld; UNITED STATES' AmigaWorld, Cable in the Classroom, CD Review, CD Compendium, Desktop Video World, DOS Resource Guide, Electronic News, Federal Computer Week, Federal Integrator, GamePro, inCider/A+, IDG Books, Infoworld, Infoworld Direct, Laser Event, Macworld, Multimedia World, Network World, NeXTWORLD, PC Games, PC Letter, PC World, Publish, SunWorld, SWATPro, Video Event, Video Toaster World; VENEZUELA'S Computerworld Venezuela, MicroComputerworld Venezuela; VIETNAM'S PC World Vietnam.

Have A Problem With Your Subscription?

We want to solve it to your complete satisfaction, and we want to do it fast. Please write to:
COMPUTERWORLD, P.O. Box 2043, Marion, Ohio 43305-2043.

Your magazine subscription label is a valuable source of information for you and us. You can help us by attaching your magazine label here, or copy your name, address, and coded line as it appears on your label. Send this along with your correspondence.

Address Changes or Other Changes to Your Subscription

All address changes, title changes, etc. should be accompanied by your address label, if possible, or by a copy of the information which appears on the label, including the coded line. Please allow six weeks for processing time.

Your New Address Goes Here

Name

Company

Address

City State Zip

Address shown: ❑ Home ❑ Business

Other Questions and Problems

It is better to write us concerning your problem and include the magazine label. Also, address changes are handled more efficiently by mail. However, should you need to reach us quickly the following toll-free number is available:

1-800-669-1002
Outside U.S. call (614) 382-3322

COMPUTERWORLD
The Newspaper of IS
P.O. Box 2043, Marion, Ohio 43305

Before.

After August '93.

What will happen to workgroup productivity after August 12? For the thousands of corporate decision makers and technical officers attending GroupWare '93, working as a team will never be the same.

Groupware '93. Four days. 80 sessions. 100 exhibitors.

This conference focuses on the commercial aspects of groupware, including solutions based on electronic messaging, electronic calendaring and scheduling, group editing and project management. Groupware '93 will provide the information you need to re-engineer your business processes, increase customer satisfaction, gain competitive advantage, increase the quality of your service and enhance productivity.

All the hottest solutions. All the biggest names. All in one place.

Groupware '93. Reshaping the flow of corporate information.

Call now for the full conference agenda and your free VIP exhibit hall pass.

GROUPWARE '93 CONFERENCE & EXHIBITION

WHAT:
Groupware '93
The Workgroup
Solutions Conference

WHERE:
San Jose Convention
Center, San Jose, Ca.

WHEN:
August 9-12

Produced by The Conference Group, 10245 E. Via Linda, #220, Scottsdale, AZ 85258

For More Information, Call
1-800-247-0262

For Immediate Service, Fax
1-602-661-0449

GROUPWARE '93 CONFERENCES WORLDWIDE: STOCKHOLM LONDON FRANKFURT SYDNEY

Companies in this issue

Page number refers to page on which story begins

3Com Corp. 70

A

Aberdeen Group 8,20,81
Adobe Systems, Inc. 24
Advanced Micro Devices, Inc. 45,148,149
Advanced Research and Applications Corp. 16
Age Logic, Inc. 16
Allied Computer Group, Inc. 12
Alps Electric, Inc. 71
Amdahl Corp. 61,84
American Power Conversion, Inc. 73
Andersen Consulting 16,107,116,132
Andersen, Jones & Muller Associates 133
Andyne Computing Ltd. 62
Apple Computer, Inc. 1,8,12,16,45, 52,62,109,121
Approach Software Corp. 4
Arkwright Insurance 132
ASK Group, Inc. 62
AST Research, Inc. 149
Atelier Research 114
AT&T 6,16
Attachmate Corp. 10

B

Baltimore Association for Systems Management 102
Bank of America 6
Banyan Systems, Inc. 6,65
Bell Atlantic Network Services, Inc. 93
Bell Atlantic Corp. 16
Bell Sygma Systems Management 20
BellSouth Telecommunications 73
Beyond, Inc. 4
BIS Strategic Decisions 1
Blue Cross/Blue Shield of California 6
Boeing Computer 16
Boise Cascade Office Products 74
Borland International, Inc. 4,109,116
Bose Corp. 104
British Airways 84
BSI Consulting 45

C

Cabletron Systems, Inc. 150
Cadkey, Inc. 65
Cadre Technologies, Inc. 114
Caesar's World 6
Campbell Services, Inc. 10
Cap Gemini America, Inc. 107
Carnegie Mellon University 16
Carolina Telephone 73
Casio, Inc. 6,12
Caterpillar, Inc. 12
Cedars-Sinai Physicians' Association 6
Centerline Software, Inc. 107,109
Centers for Disease Control and Prevention 1
CES Business Systems 89
Chalstrom Consulting 4
Charles Schwab & Co. 16
Chase Manhattan Bank NA 16
Chorus Systems, Inc. 8
Chrysler Corp. 6
Cigna Co. 4
Citibank NA 6
Citicorp 73
Cleveland Consulting Associates 99,102
Coca-Cola Schwepps Ltd. 84
Compaq Computer Corp. 1,2,6,12,14,150
Component Software Corp. 93
Computer Associates International, Inc. 16
Computer Design Professionals 132
Computer Intelligence/Infocorp 6,12,149
Computer Network Technology Corp. 79
Computer Sciences Corp. 102
Computone Corp. 71
Congruent Corp. 16
Corning, Inc. 104
Cray Research, Inc. 6,73
Creative Strategies Research International, Inc. 45

D

DataCard Corp. 104
DataEase International, Inc. 98
Dataquest, Inc. 149
Dean Witter Reynolds 12
Dell Computer Corp. 1
Delrina Corp. 4,67
Digital Equipment Corp. 1,6,8,12,14,62,65,73,74,88,150
Digital Link, Inc. 20
Digitalk, Inc. 107,109,114,116
Dynamic Information Systems Corp. 89

E

Eastman Kodak Co. 4
EDventure Holdings, Inc. 24
Effective Information 118
Electronic Data Systems Corp. 6
Elf Atochem 104
EMC Corp. 6
Enable Software, Inc. 62
Environmental Systems Research Institute, Inc. 61
Envoy Systems Corp. 71
Everex Systems, Inc. 1
Excelan Corp. 149
Exide Electronics Group, Inc. 73

F

Federal Express Corp. 16
Fidelity Investment & Network Service, Inc. 1,65
First Bancorp of Ohio 104
First Market Research Corp. 116
Fluent, Inc. 149
Forrester Research, Inc. 65,107
Frame Technology Corp. 149
Fred Rothenberg & Associates 6
Fujitsu Ltd. 33,84
Fujitsu Network Switching of America 73

G

Gartner Group, Inc. 4,74,81
Gateway 2000, Inc. 1,6
Glaco, Inc. 107,111
Granite Construction 65
Groupe Bull 88
GTE Telephone Operations 73
Gupta Corp. 16,93,111

H

Hallmark Cards, Inc. 52
Harvest Software, Inc. 74
Hayes Microcomputer Products, Inc. 62
Health Information Technologies 6
Hewlett-Packard Co. 1,2,6,8,16,20, 45,65,70,88,109,114,121
Hughes Aircraft 107
Hummingbird Communications Ltd. 16
Hurwitz Consulting Group 16
HyperDesk Corp. 65,149

I

IBM 1,4,6,8,10,12,16,20,45,65, 79,81,86,89,99,109,149,150
ICL Ltd. 84
In Focus Systems, Inc. 33
Inacom Corp. 12
Index Summit 107,114
Industrial Light & Magic 150
Inference Corp. 107,114
Information Builders, Inc. 96
Informix Corp. 62,109
Intel Corp. 1,20,45,65,121,148,149
Intellicorp 109,114
InterLab, Inc. 1
International Data Corp. 1,45,65,81,88
International Trade Commission 149
IQ Software 62
ITOM International Co. 6

J

JC Penney Co. 16,99,102
Jet Propulsion Laboratory 65
Johns Hopkins Hospital 67
Josephthal Lyon & Ross 148

K

Kaiser Permanente of Northern California 6
KFC Corp. 96
Kidder, Peabody & Co. 81
Kmart Corp. 6
Knowledge Systems Corp. 93
KnowledgeWare, Inc. 89
Kokusai Denshin Denwa 16
Kraft General Foods 104

L

Labtam Australia Pty. Ltd. 14
Lawrence Livermore National Laboratory 14
Levi Strauss & Co. 99
Lincoln National Life Insurance Co. 48
Lotus Development Corp. 4,16,96

M

M. D. Anderson Cancer Center 65
Mantech International, Inc. 74
McData Corp. 79
MCI Communications Corp. 6
Mercury Technologies, Inc. 107
Meta Group, Inc. 10,93
Metropolitan Life Insurance Co. 45
MHS Alliance 16
Microsoft Corp. 1,2,4,6,8,16,12,14,16,45,48, 62,65,71,73,89,93,96,107,109, 114,118,149,150
Microsystems Software, Inc. 10
MicroTouch Systems, Inc. 62
Milbank, Tweed, Hadley & McCloy 1
MIT 73
Murkworks, Inc. 116

N

National Computer Security Association 16
National Institutes of Health 16,65
Natural Language, Inc. 62
NCR Corp. 73,81
NetLabs, Inc. 20
NetManage, Inc. 71
Network Computing Devices, Inc. 16
Network Security Systems, Inc. 73
New Science Associates, Inc. 6
New York Telephone 73
Next, Inc. 8,109,114,121
Norand Corp. 149
Novell, Inc. 4,6,8,10,14,16,20,65,73,78,149

O

Object Design, Inc. 65
Object International, Inc. 116
Object Management Group 8,107
Object Technology International, Inc. 107
Objective Systems 114
Open Software Foundation 6
Oracle Corp. 1,4,8,62,81
Oregon State Treasury 10

P

Parametric Software 93
PurePlace Systems, Inc. 107,109,118
Patricia Seybold's Office Computing Group 6
Pennsylvania State University 102
PenUltimate, Inc. 149
Performance Technologies, Inc. 62
Performance Computing, Inc. 93,96
Planar Systems, Inc. 33
P&O Containers Ltd. 84
Positive Support Review 132
Powercore, Inc. 16
Powersoft Corp. 93,111
Proteon, Inc. 79
PruCare of California 6

R

Random Access, Inc. 149
Rational Systems, Inc. 114
Red Brick Systems 16
Rhodes College 14
Rogue Wave Software, Inc. 107
Rome Laboratory 78
R. R. Donnelly & Sons Co. 24

S

Sara Lee Corp. 1
Scrivner, Inc. 2
SDB Systems, Inc. 57
Sequent Computer Systems, Inc. 84
Sequoia Systems, Inc. 81
Serena International 89
Serius Corp. 149
Servio Corp. 65
S. G. Warburg & Co. 148
Shana Corp. 67
Sharp Ltd. 33
Silicon Graphics, Inc. 6,150
Society for Information Management 104
Software Engineering Institute 93
Software Publishing Corp. 4
Software Transformation, Inc. 149
Southern Bell 73
Southern California Edison 107
Sprint Corp. 16
Stanford Resources, Inc. 33
Storage Technology Corp. 6
Stratus Computer, Inc. 6,81
Summit Strategies 111
Sun Microsystems, Inc. 6,14,20,48,65, 71,73,81,150
Sybase, Inc. 6,62,96
Symantec Corp. 62
SynOptics Communications, Inc. 20
Syracuse University 73,104
System Software Associates, Inc. 89

T

TakeCare 6
Taligent, Inc. 114
Tandem Computers, Inc. 6,81
Tandy Corp. 1,2,149
Tekelec 79
Tektronix, Inc. 52
Tesco Stores Ltd. 84
Texas Commerce Bancshares 104
Texas Instruments, Inc. 16,33,114
The Burton Group 149
The Ohio State University 20
The Santa Cruz Operation 14
The Wollongong Group, Inc. 71
The World Bank 16
Toshiba Corp. 12
Trico Title Co. 132
Twinhead International, Inc. 149

U

Unigas Corp. 81,88,93
Unisys Corp. 6
Unix System Laboratories, Inc. 6

V

Verifone, Inc. 14
VF Corp. 90
Vitro Corp. 93

W

Walgreen Co. 78
Wang Laboratories, Inc. 4,10
Waste Management, Inc. 4
Watermark Software, Inc. 4
Weizer Associates, Inc. 4
Wertheim Schroder & Co. 148
Westinghouse Corp. 65
Weyerhaeuser Co. 6
Wingra Technologies, Inc. 74
Wohl Associates 2
Wonderware Corp. 149
WordPerfect Corp. 10,24,62
Wright-Patterson Air Force Base 4

X

Xerox Corp. 2
X/Open Co. 14

Z

Zinc Software, Inc. 107

Gainers Losers

Percent

Bolt, Beranek & Newman	37.8	Advanced Micro Devices	-24.9
Group 1 Software	20.8	Apple Computer Inc.	-19.5
Aspen Communication Corp.	16.2	Gupta	-18.8
Intelligent Info. Systems	14.3	Software Toolworks Inc.	-15.7
Inacom Corp.	14.2	Computervision Corp	-15.4
Walker Interactive Systems	13.3	MathSoft (L)	-14.5
Phoenix Technologies	12.5	Picturetel Corp.	-14.4
Cognitronics Corp	12.1	Proteon Inc.	-14.3

Dollar

Newbridge Networks Corp.	3.50	Apple Computer Inc.	-30.75
Synoptics Communications	3.38	3Com Corp	-7.38
Intelligent Info. Systems	3.00	Advanced Micro Devices	-2.00
Xyvision Corp	2.75	Compaq Computer Corp.	-5.63
Adobe Systems Inc.	2.63	Microsoft Corp.	-4.38
Inacom Corp	2.63	Creative Technologies Inc.	-3.75
Ramtron Technologies Inc. (U)	2.50	Gupta	-3.63
American Info Techs Corp.	2.50	Picturetel Corp.	-3.25

Legal jitters ease

Sometimes the best way to handle a threat is to ignore it. That wisdom comes from Wall Street equities analysts looking at Intel Corp. (INTC) and Advanced Micro Devices, Inc. (AMD).

Patent decisions can alter a high-tech company's future abruptly — with the potential for a corresponding drop in stock valuation. In AMD's case, a losing final decision in its legal tiff with Intel could cost the smaller firm its piece of the PC processor market and a boatload of cash (see story opposite page).

But the market's reaction to last week's appellate court decision was relatively muted, and several analysts continued to recommend the purchase of both Intel and AMD issues.

Analysts said investors are getting used to the legal tug-of-war and are basing their investment decisions more on company fundamentals. To handle the vicissitudes of investing in firms that are involved in lawsuits, "you need a Maalox and an aspirin, and that's it," said S. G. Warburg & Co. analyst David Wu. "These lawsuits will go on as long as we live, and there's no way to predict a winner."

Several other analysts agreed that a final verdict, in the case of Intel and AMD, is years away. "People are starting to realize that these issues are very gray, and if they don't see an imminent decision, they are likely to revert to looking at earnings estimates," said Lawrence Borgman, senior vice president at Josephthal Lyon & Ross.

The bitterly contested case is a fairly extreme example of computer industry litigation, analysts agreed. Other cases have been somewhat more predictable. "If the company filing suit has a history of settling out of court, you can work with that" to help guide investment decisions, said Stuart Johnson, vice president of research at Wertheim Schroder & Co. — *Derek Slater*

Nearly unanimous

Many Wall Street analysts say both Intel and AMD merit purchase

Dull & Phelps	Buy	Buy
Josephthal, Lyon & Ross	Buy	Hold
Pershing & Co.	Buy	Buy
S. G. Warburg & Co.	Buy	Buy
Wertheim Schroder & Co.	Neutral	Neutral

Exch	52-Week Range			June 11 3PM	Wk Net Change	Wk Pct Change
COMMUNICATIONS AND NETWORK SERVICES						
OTC	40.00	9.63	3 COM Corp	25.88	0.63	-2.4
NYS	80.25	62.63	American Info Techs Corp	76.00	2.50	3.4
NYS	62.75	44.63	AT&T (H)	62.00	0.50	0.8
OTC	3.50	0.75	Artel Communication Corp	3.00	0.44	16.7
OTC	24.50	10.25	Banyan Systems Inc.	15.38	0.13	0.9
NYS	56.75	43.88	Bell Atlantic Corp	56.50	1.50	2.7
NYS	97.50	66.75	Bellsouth Corp	93.13	0.13	0.2
NYS	7.75	3.63	Bolt, Beranek & Newman	7.75	2.13	37.8
OTC	18.50	9.50	Brooktrout Technology	12.25	0.25	2.3
NYS	102.00	45.25	Cabletron Systems	99.88	0.88	0.9
OTC	22.75	3.75	Centigram Communications	20.25	-0.75	3.6
OTC	43.50	19.00	Cimcom Corp.	39.13	2.50	6.8
OTC	56.25	21.38	Cisco Systems Inc.	53.00	1.25	2.4
OTC	16.38	5.50	Compression Labs Inc.	11.63	-1.38	10.6
OTC	36.00	13.00	CrossComm	30.25	0.25	0.8
OTC	4.63	1.00	Data Switch Corp	2.75	0.00	0.0
NYS	20.25	12.38	Orbital Comm Assoc.	12.75	0.13	1.0
OTC	12.25	4.50	Orbital Systems Int'l Inc	5.25	0.00	0.0
OTC	44.00	4.25	OSC Communications	43.13	-0.63	1.4
OTC	9.50	4.25	Fibronix Int'l Inc	6.50	0.50	8.3
OTC	24.75	8.75	Filenet Corp.	12.25	0.00	0.0
OTC	4.38	1.50	Gandalf Technologies Inc	3.13	0.13	4.2
OTC	2.06	0.69	Gateway Communications	1.06	-0.06	-5.5
NYS	13.75	2.88	General Datacomm Inds. (H)	14.38	1.25	9.0
ASE	3.75	2.00	Go Video	2.94	9.31	11.9
NYS	37.75	30.63	GTE Corp	35.13	0.13	0.4
NYS	85.13	62.50	ITT Corp	81.25	2.25	-2.7
OTC	57.13	30.75	MCI Communications Corp	54.50	-0.88	-3.6
OTC	9.75	2.25	Microcom Inc.	4.00	0.00	0.0
OTC	24.25	4.75	Netrix Corp	5.25	0.25	5.0
OTC	19.00	8.75	Network Computing Devices	9.75	0.00	0.0
NYS	15.00	5.38	Network Equipment Tech.	8.88	-0.13	1.4
OTC	21.00	8.00	Network General	9.75	0.25	-2.6
OTC	15.75	8.38	Network Systems Corp (L)	9.13	0.13	1.4
OTC	85.63	15.00	Newbridge Networks Corp	81.00	5.50	7.5
NYS	46.00	30.50	Northern Telecom Ltd	36.38	0.63	1.7
NYS	35.25	27.50	Novell Inc.	28.25	0.25	0.9
NYS	92.50	76.00	Nynex Corp	87.75	2.75	3.2
OTC	30.00	14.50	Octel Communications Corp	21.25	-1.00	-4.5
OTC	6.13	3.38	Penril Data Comm Networks	4.38	0.13	2.9
OTC	38.50	20.75	Picturetel Corp.	19.25	-3.75	-14.4
OTC	15.25	6.25	Proteon Inc.	5.25	-0.88	-14.3
NYS	35.00	14.25	Scientific Atlanta Inc.	32.75	-1.00	-3.0
NYS	40.75	25.69	Southwestern Bell Corp	39.00	0.50	1.3
NYS	33.25	21.00	Sprint Corp.	30.75	-0.13	-0.4
OTC	27.00	10.50	Standard Microsystems Corp	17.38	0.88	5.3
OTC	18.50	6.88	Stratacom Inc	14.25	0.00	0.0
OTC	128.25	27.75	Synoptics Communications	109.88	3.38	3.2
OTC	7.00	3.88	Telebit Corp (L)	6.25	0.13	3.0
OTC	9.38	2.13	Telematics Int'l Inc.	7.00	0.38	5.7
OTC	25.50	13.38	US Robotics	21.25	-0.75	-1.2
NYS	45.00	34.88	US West Inc.	40.25	0.13	0.3
OTC	55.50	12.00	Wellfleet Communications	47.50	2.75	5.0
OTC	14.75	7.00	Xircom (H)	14.00	0.88	0.0
PCS AND WORKSTATIONS						
OTC	4.00	2.50	Advanced Logic Research	3.75	-0.44	-10.5
OTC	64.75	41.50	Apple Computer Inc	44.25	-10.75	19.5
OTC	24.75	11.25	AST Research Inc.	14.50	-1.00	-6.3
NYS	11.38	2.63	Commodore Int'l.	3.00	0.13	4.5
NYS	61.75	23.13	Compaq Computer Corp	54.13	-3.63	-9.4
OTC	88.88	15.00	Dell Computer Corp	20.25	-2.13	-9.5
NYS	88.88	50.25	Hewlett Packard Co.	86.13	-0.50	-0.6
NYS	38.50	16.13	Silicon Graphics	34.63	-1.63	-4.5
OTC	41.00	22.50	Sun Microsystems Inc	30.63	-1.38	-4.3
NYS	32.38	22.25	Tandy Corp	29.88	-1.00	-3.2
OTC	8.25	2.75	Zeos International Ltd	4.13	0.00	0.0
LARGE SYSTEMS						
ASE	16.38	4.63	Amdahl Corp.	5.50	9.00	0.0
NYS	8.75	4.25	Convex Computer	5.88	-0.50	-2.0
OTC	4.13	1.88	Cray Computer	3.38	0.00	0.0
NYS	32.50	19.00	Cray Research Inc.	27.50	-0.75	-2.7
NYS	13.88	7.13	Data General Corp.	30.00	-0.75	7.0
NYS	49.25	30.38	Digital Equipment Corp.	42.50	-0.88	-2.0
NYS	38.63	26.25	Harris Corp	37.63	0.38	1.0
NYS	100.38	65.88	IBM	92.50	-1.25	-2.3
OTC	22.00	5.50	Kendall Square Research	16.63	-0.38	-2.2
NYS	127.50	83.00	Matsushita Electronics	122.00	-2.00	-1.6
OTC	23.75	8.25	NetFrame	16.13	0.25	1.6
OTC	15.50	9.25	Parallan Computer	15.00	-1.00	-7.1
OTC	19.00	6.00	Pyramid Technology	18.00	-0.25	-1.4
OTC	24.00	13.50	Sequent Computer Sys.	18.88	-0.63	-3.2
OTC	12.13	1.38	Sequoia Systems Inc	1.94	-0.06	-3.1
NYS	48.38	25.50	Stratus Computer Inc.	30.75	-0.88	-2.8
NYS	16.88	9.88	Tandem Computers Inc.	12.88	0.00	0.0
OTC	19.00	10.63	TriCord Systems	12.25	-0.88	-4.8
NYS	13.88	7.75	Unisys Corp.	11.38	-0.50	-4.2
SOFTWARE						
OTC	71.50	25.25	Adobe Systems Inc.	68.00	2.63	4.0
OTC	20.75	10.75	Aldus Corp.	15.75	-0.38	-2.3
OTC	14.25	5.50	American Software Inc	6.00	0.38	6.9
OTC	28.13	9.75	Ase Computer Systems	11.00	-1.25	-10.2
OTC	56.50	32.75	Autodesk Inc.	52.00	2.13	4.3
OTC	13.00	2.50	Bachman Info. Systems	5.13	0.00	0.0
OTC	43.00	32.00	BGS Systems Inc.	33.75	0.75	2.3
OTC	84.13	37.25	BMC Software Inc.	50.25	-0.88	-1.7
OTC	28.25	17.00	Boole & Babbage	24.00	0.50	2.1
OTC	49.00	17.50	Borland Int'l. Inc.	22.88	-3.13	-4.7
OTC	5.63	3.00	CE Software	3.31	-0.31	-8.6
ASE	30.25	6.75	Cheyenne Software Inc	27.13	0.00	0.0
OTC	19.50	8.25	ChipSoft	10.25	-0.50	-4.2
OTC	9.25	5.63	Cognos Inc.	6.50	0.13	-1.9
NYS	31.38	10.88	Computer Associates	27.50	0.75	0.9
NYS	12.38	2.75	Computervision Corp.	4.13	-0.75	-15.4
OTC	34.25	19.75	Compuware Corp	23.25	1.00	4.5
OTC	14.75	3.75	Comshare Inc.	7.75	0.50	6.9
OTC	17.25	10.75	Cosmi Corp.	15.75	0.13	0.8
OTC	27.00	5.25	Easel Corp	6.38	0.38	6.3
OTC	25.25	12.00	4th Dimension	17.75	2.25	-11.3
OTC	19.50	5.75	Frame Technology (L)	6.00	-0.63	-9.4
OTC	20.75	50.00	Group 1 Software	12.00	2.00	20.0
OTC	35.75	15.63	Gupta	15.63	-3.63	-18.8
OTC	8.75	3.50	Hogan Systems Inc.	7.75	-0.13	1.6
OTC	25.75	11.25	IMRS	18.75	0.50	2.7
OTC	36.00	18.50	Information Resources	35.50	1.25	3.6
OTC	49.75	12.13	Informix Corp	48.50	0.25	1.7
OTC	16.75	8.88	Intergraph Corp. (L)	9.88	0.50	5.3
OTC	33.63	6.88	Interleaf Inc.	8.38	-0.25	-2.9
OTC	18.00	6.50	Intersolv Inc.	7.00	0.25	3.7
OTC	16.00	7.75	Knowledgeware Inc.	10.00	0.25	2.6
OTC	54.75	26.00	Legent Corp	30.63	2.38	8.4
OTC	36.75	14.75	Lotus Development	33.50	-0.63	-1.8
OTC	23.00	6.50	MathSoft (L)	6.63	-1.13	-14.5
OTC	23.25	5.25	McAfee Associates	7.00	0.75	12.0
OTC	31.63	1.88	Mica Software	50.63	-0.25	-2.5
OTC	13.75	5.25	Mentor Graphics	10.75	0.38	3.6
OTC	46.00	27.25	Micro Focus	34.00	0.00	0.0
OTC	17.25	4.38	Micrografx Inc.	5.63	-0.13	-2.2
OTC	98.88	65.50	Microsoft Corp	89.63	-4.38	-4.7
OTC	44.61	14.00	Oracle Corp	42.38	-2.00	-4.5
OTC	34.25	13.38	Parametric Technology	29.00	-1.63	-5.3
OTC	40.50	22.50	Peoplesoft	33.75	-1.25	-3.8
OTC	7.13	3.50	Phoenix Technologies	5.63	0.63	12.5
OTC	80.00	24.75	Powersoft (L)	26.00	1.13	4.3
OTC	41.50	17.00	Platinum Software	25.50	0.50	2.0
OTC	25.00	13.25	Platinum Technology	13.75	0.13	0.9
OTC	61.50	29.00	Progress Software Corp	34.00	-2.50	-6.8
OTC	13.25	2.50	Quarterdeck Office Sys.	3.19	-0.13	-3.8
OTC	26.25	11.75	Rainbow Technologies Inc. (H)	26.25	2.50	10.3
OTC	13.00	4.00	Rasterops	8.75	-0.88	-9.1
OTC	15.25	3.63	Ross Systems	12.00	-0.88	-6.8
OTC	27.25	8.50	Sapiens Intl. Corp. N.V.	23.25	0.38	1.6
OTC	24.50	6.75	Software Publishing Corp.	7.75	-0.38	-4.6
OTC	12.00	2.00	Software Toolworks Inc.	9.38	1.75	-15.7
OTC	4.13	0.75	Sophisticated Software	1.38	0.00	0.0
OTC	12.75	3.25	State of the Art	10.75	0.00	0.0
NYS	24.63	13.75	Sterling Software Inc	19.50	0.75	4.0
OTC	22.50	0.00	Struct. Dynamics Research	18.75	-0.25	-1.4
OTC	72.75	21.00	Sybase Inc.	69.13	0.88	1.3
OTC	42.75	5.88	Symantec Corp.	15.75	-1.88	-10.6
NYS	12.50	3.25	Systems Center Inc.	10.25	0.13	1.2
OTC	25.50	10.00	System Software Assoc.	19.25	0.00	0.0
OTC	6.50	2.50	Tensilica Corp.	3.25	-0.38	-10.3
OTC	22.75	9.13	Viewlogic Systems	18.13	-0.38	-2.0
OTC	23.50	6.75	Walker Interactive Systems	8.50	1.00	13.3
OTC	3.19	1.38	Wordstar	1.63	0.06	4.0
SEMICONDUCTORS						
NYS	52.88	7.38	Advanced Micro Devices	21.13	-7.00	24.9
NYS	21.38	9.00	Analog Devices Inc.	38.75	-0.63	-3.2
OTC	24.38	7.63	Atmel Corp.	24.13	0.25	1.0
OTC	7.75	2.75	Chips and Technologies	3.88	-0.50	-11.4
OTC	39.75	13.00	Cirrus Logic	18.88	-1.50	2.4
NYS	14.38	2.38	Cypress Semiconductor Corp	13.38	-0.50	-3.6
NYS	16.13	8.00	Dallas Semiconductor	14.13	-1.00	-6.6
OTC	60.63	23.88	Intel Corp.	56.50	0.31	0.6
NYS	14.50	4.88	LSI Logic Corp (H)	13.63	-0.13	-0.9
OTC	33.25	13.75	Lattice Semiconductor	29.13	0.13	0.4
NYS	31.13	13.13	Micron Technology (H)	31.75	0.03	2.0
NYS	88.00	37.13	Motorola Inc.	84.00	-2.25	2.6
NYS	15.88	8.50	National Semiconductor (H)	14.75	-0.88	-5.6
OTC	16.50	6.50	Sierra Semiconductor	8.00	0.25	3.2
OTC	43.25	22.25	SynOptics	39.00	-1.25	-3.3
NYS	69.00	32.25	Texas Instruments	46.38	-2.25	-3.3
OTC	8.88	6.00	VLSI Technology	8.00	0.00	0.0
OTC	9.88	2.13	Weitek	9.88	0.75	8.2
ASE	9.63	4.13	Western Digital Corp.	4.63	-0.25	-5.1
OTC	18.50	14.50	Xilinx	33.75	2.25	-6.3
OTC	32.38	12.66	Zilog Inc.	32.38	0.88	2.8
PERIPHERALS/ENCLOSURES						
OTC	39.25	11.75	American Power Conversion	37.00	-0.50	1.3
OTC	20.16	13.84	Banctec Inc.	18.25	-0.75	-3.9
OTC	18.00	6.25	Cambex Corp.	7.00	-0.38	-5.1
ASE	18.38	6.50	Cognitronics Corp	10.88	1.25	12.1
NYS	25.50	10.38	Conner Peripherals (L)	10.50	-1.00	-8.7
OTC	38.50	10.75	Creative Technologies Inc	28.75	-3.75	-11.5
OTC	30.75	14.75	Data Race Inc.	19.75	-2.25	-10.2
ASE	17.00	4.75	Databam Corp.	9.50	-1.00	-9.5
NYS	18.63	5.06	EMC Corp	17.38	-0.56	-3.1
OTC	10.50	3.38	Emulex Corp	2.13	0.13	3.2
OTC	19.00	13.25	Evans & Sutherland	16.50	0.38	-2.2
OTC	33.00	10.88	Exabyte (L)	20.88	-1.63	-13.0
OTC	26.00	7.09	Intelligent Info. Systems	24.00	3.00	14.5
OTC	6.88	3.88	Ionsera Corp.	4.19	-0.06	-1.3
OTC	21.25	5.75	IPL Systems Inc.	8.00	0.75	10.3
OTC	24.00	10.75	Komag Inc.	20.25	0.25	1.3
OTC	19.63	5.88	Maxtor Corp.	6.50	-0.38	-5.5
OTC	11.25	5.75	Micropolis Corp.	7.25	0.00	0.0
NYS	117.00	94.75	3M Corp	108.00	-2.38	-6.4
OTC	7.25	4.00	Printronix Inc.	6.50	-0.25	-3.7
NYS	17.25	6.88	QMS Inc.	8.88	-0.75	-7.8
OTC	17.88	11.63	Quantum Corp	11.88	-0.50	-4.0
OTC	32.25	3.25	Raphus Inc. (L)	3.50	0.06	1.9
NYS	16.50	7.50	Recognition Equipment	14.50	-1.00	-6.3
OTC	13.88	4.50	Reson Inc	3.13	0.25	5.1
OTC	22.38	12.00	Seagate Technology	34.88	-0.88	-5.6
NYS	45.00	18.00	Storage Technology	36.88	-2.50	-6.3
NYS	37.88	16.88	Tektronix Inc.	23.13	-0.25	3.1
NYS	88.88	66.75	Xerox Corp	75.13	0.00	0.0
SERVICES						
OTC	23.25	14.25	American Mgmt. Systems	17.50	0.00	-4.6
NYS	4.75	2.75	Analogic Inc	3.00	0.00	0.0
OTC	35.75	16.25	Analysts Int'l.	26.25	-0.75	-2.8
NYS	56.13	38.75	Auto Data Processing	49.38	0.13	0.3
NYS	17.25	11.22	Ceridian Corp	14.50	0.13	0.9
NYS	17.38	13.13	Comdisco Inc.	14.50	0.25	1.8
OTC	8.25	4.50	Computer Horizons	7.25	0.50	6.9
NYS	80.50	57.00	Computer Sciences	75.38	0.13	0.2
NYS	9.25	6.50	Computer Task Group	7.00	0.00	0.0
NYS	40.50	22.00	CompUSA Inc.	33.50	0.50	1.5
OTC	14.25	6.00	Corporate Software	12.00	0.25	2.1
OTC	19.75	7.38	Egghead Discount Software	8.63	0.25	3.0
NYS	35.88	25.75	General Motors E (EDS)	30.13	-1.00	-3.2
OTC	25.50	9.25	Inacom Corp.	21.13	2.63	14.2
OTC	15.38	6.25	Intelligent Electronics	12.38	-0.75	-5.7
OTC	33.00	6.63	Medisel	12.38	-0.25	-2.0
OTC	16.25	3.75	Microage Inc.	13.25	0.00	0.0
OTC	43.00	23.75	Paychex	39.00	-2.25	-3.7
NYS	47.25	32.88	Policy Management Sys.	38.38	0.63	1.7
NYS	38.50	16.81	Reynolds and Reynolds	37.75	0.00	0.0
OTC	33.00	22.00	SEI Corp.	31.00	-1.25	-3.9
OTC	24.38	16.88	Shared Medical Systems	22.13	-0.13	-0.8
OTC	12.63	5.75	SHL Systemhouse	10.63	-0.75	-6.6
OTC	29.25	18.25	Software Spectrum Inc.	27.75	0.50	1.9
OTC	33.25	22.50	Sungard Data Systems	30.50	-0.50	-1.6
NYS	4.38	1.13	Ultimate Corp.	3.38	-0.50	-12.9

KEY: (H) = New annual high reached in period (L) = New annual low reached in period

Copyright Nordby International, Inc., Louisville, CO
This information is based on sources believed to be reliable, and while extensive efforts are made to assure its accuracy, no guarantees can be made. Nordby International and Computerworld assume no liability for any inaccuracies. For phone numbers, addresses, or any additional financial information on any of the above companies call Nordby International at (303) 666-5303.

Second-class postage paid at Framingham, Mass., and additional mailing offices. Computerworld (ISSN 0010-4841) is published weekly, with a single combined issue for the last week in December and the first week in January by CW Publishing Inc., 375 Cochituate Road; Box 9171, Framingham, Mass. 01701-9171. Copyright 1993 by CW Publishing Inc. All rights reserved. Computerworld can be purchased on microfilm and microfiche through University Microfilms Inc., 300 N. Zeeb Road, Ann Arbor, Mich. 48106. Computerworld is indexed. Back issues, if available, may be purchased through the circulation department. Photocopy rights: permission to photocopy for internal or personal use is granted by CW Publishing Inc. for libraries and other users registered with the Copyright Clearance Center (CCC), provided that the base fee of $3 per copy of the article, plus $.50 per page is paid directly to Copyright Clearance Center, 27 Congress Street, Salem, MA 01970. Reprints (minimum 500 copies) and permission to reprint may be purchased from Sharon Bryant, CW Publishing Inc., 375 Cochituate Road, Box 9171, Framingham, Mass. 01701-9171. Requests for missing issues will be honored only if received within 60 days of issue date. Subscription rates: $6.00 a copy; U.S. – $48 a year; Canada – $110 a year; Central & So. America – $130 (surface), $450 (airmail) a year; Europe – $195 a year; all other countries – $295 a year. Four weeks notice is required for change of address. Allow six weeks for new subscription service to begin. Subscriptions call toll free (800) 669-1002. POSTMASTER: Send Form 3579 (Change of Address) to Computerworld, P.O. Box 2044, Marion, OH 43305.

In Brief

Frame restructures

Citing declining revenue and an anticipated second-quarter loss, Frame Technology Corp. is cutting its head count by 20% and will take a $13 million restructuring charge in the period. Frame has also hired George Klaus — president and chief executive officer of Integral — effective July 1. He replaces Paul Robichaux, who remains chairman of the San Jose, Calif., developer of document publishing software. Integral co-founder Kathleen Urbelis was named interim president.

Tandy line sold

Norand Corp. in Cedar Rapids, Iowa, has purchased Tandy Corp.'s Micronic/Parconin line of handheld computers, which are sold primarily in Europe. Norand will also acquire procurement rights and some short-term liabilities associated with the line. An undisclosed number of employees have been offered jobs with Norand. The deal comes just weeks after Tandy agreed to sell the bulk of its PC operations to AST Research, Inc.

SHORT TAKES The International Trade Commission agreed to investigate Intel Corp.'s patent claims against Twinhead International, Inc.... PenUltimate, Inc., an Irvine, Calif., developer of pen and mobile computing software, has agreed to sell $5 million worth of its stock in a public offering.... Random Access, Inc. in Denver has signed a letter of intent with a brokerage to underwrite a public offering next month of approximately 2 million shares of common stock.... Irvine, Calif.-based Wonderware Corp. last week filed a proposal for a planned initial public offering of 2.25 million shares of common stock expected to sell for between $10 and $12 a share.

Novell buys to build developer's framework

By Michele Dostert
PROVO, UTAH

■ Novell, Inc. expects to announce a new application development architecture later this month that will use its recently acquired object-oriented technology to simplify the development of distributed applications on the NetWare operating system.

More acquisitions are rumored to be imminent. Novell is reportedly negotiating to purchase Fluent, Inc., a Natick, Mass., company specializing in multimedia application tools. Novell and Fluent officials declined to comment on the matter.

However, Darrel Miller, Novell's executive vice president, said the company intends to make more acquisitions and partnerships during the next year. "Novell is always in the market for best-of-breed, multiplatform technology," he said.

During the next two years, according to Miller, Novell will be targeting what it thinks will be the hottest niche in the networking market: dedicated application servers. But in this arena, NetWare must compete with Microsoft Corp.'s Windows NT and IBM's OS/2, which is why Novell has been aggressively acquiring application development technology.

Novell has a three-pronged plan of attack for this application server market. First, it is beefing up NetWare's object-oriented application development support using technologies acquired from Hyperdesk Corp. in Westboro, Mass., Software Transformation, Inc. in Cupertino, Calif., and Serius Corp. in Salt Lake City (see chart).

Novell's upcoming application development architecture, called FrameWare, will provide developers with a template to more easily build object-oriented, cross-platform networked applications.

Buying spree

Hyperdesk	NA*	Object-management interface
Software Transformation	$25.8M	Cross-platform development APIs
Serius	$17.25M	Cross-platform application development language
Unix System Laboratories	$100M	Control of Unix System V source code

*Not available

"All of this object-oriented technology Novell has acquired is aimed at strengthening NetWare against NT and OS/2 in application development," said Stan Schatt, a local-area network analyst at Computer Intelligence/Infocorp in Santa Clara, Calif.

Secondly, Novell is touting its System V Release 4-based UnixWare as a platform for developing both Unix and NetWare-based applications. "There are hundreds of existing Unix applications that can be easily ported to UnixWare and then sold to all those NetWare users, which makes UnixWare very attractive to developers," said Jamie Lewis, an analyst at The Burton Group in Salt Lake City.

Third, it has defined and expanded a set of System Application Services that NetWare can provide to application developers, including imaging engines, multimedia application programming interfaces and messaging and directory services.

A fourth prong may be to look beyond current technological hot spots when considering future acquisitions, company officials said. "Novell's strategy is to anticipate today which technologies will be in high demand three to five years from now and acquire companies that are working in that area," Miller said.

Novell thinks that five years down the road the most in-demand technology will be connectivity products that move users from the current, many-to-one client/server model to a many-to-many web of information sources — available worldwide via intelligently programmed devices, according to Miller.

"We'll need a whole set of new tools to automate the distribution of applications and information because it will just be too complicated for a human to do. We hope to have all of the technology in hand when this market appears," Miller said.

For example, Novell officials are looking to build or acquire "smarter software" that can route, store and forward messages to users anywhere in the world automatically, Miller said.

Intel winner of 386 suit, for now

By Michael Fitzgerald

Followers of the court battles between Intel Corp. and Advanced Micro Devices, Inc. (AMD) could easily name Yogi Berra as their patron saint, as "deja vu all over again" has happened yet again.

Late on June 4, the California Sixth District Court of Appeals overturned an arbitrator's 1992 decision giving AMD the right to manufacture its clones of Intel's 80386 chip.

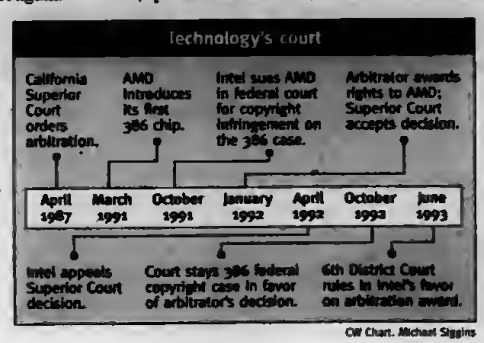
AMD's stock price fell more than 15% in the wake of the announcement.

While AMD will ask the panel to reconsider its decision, the company said it will likely have to ask the California Supreme Court to hear its appeal.

Regardless, users will probably see little impact, as "neither company's product shipments will be affected during the next year or two," predicted Ken Lowe, an analyst at Dataquest, Inc. in San Jose, Calif.

The panel's decision applies only to the 386 arbitration ruling, at a time when the market is shifting to the 486. But Intel will probably use the decision to revive a separate case alleging that AMD violated copyright laws by producing the 386. That had been stayed in a federal court in October 1992 in favor of the arbitrator's decision.

Intel had requested damages of $800 million when it filed the federal copyright case in October 1991. But some observers said Intel may up the ante to $1 billion to reflect lost sales.



CW Chart: Michael Siggins

Chip share

Dean McCarron, an analyst at Micro Design Resources, Inc. in Scottsdale, Ariz., estimated that AMD had between 55% and 60% of the total 386 market in 1992. McCarron estimated that Intel and AMD produced 14 million 386SX and DX chips between them last year, representing approximately $600 million in revenue. He said he expects AMD to gain share this year, as Intel focuses on the 486 and Pentium, though the total 386 market is shrinking.

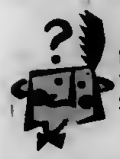
Wysiwyg

We all have some cute and some not-so-cute nicknames for our users. Here are some handles our readers use to refer to their users:

Name Game

Bunkie: An inept user who is the bane of the IS staff's existence.

Wire-haired Geeks: Very knowledgeable but still irritating users.



BMU: Stands for "Brain-Missing Users." Speaks for itself.

Unclean Masses: Users you don't want to go near because they just mean trouble.

Illustrations by Stephanie Faucher

WORD PLAY

The IS department at Acme Manufacturing Corp. was meeting with the support staff about the newly implemented client/server system when the help desk phone rang. It was a **Bunkie** asking why he had to move to the new version of Windows when he had just mastered the old version. No sooner had the user hung up when the phone rang again, with a **Wire-haired Geek** on the line wondering why the company wasn't on the beta-test list for Windows NT. Just then, Fran came into the room, apologizing for her tardiness. She had just spent a half-hour with a **BMU** teaching him how to power up his PC. She had left him still trying to master the double-click on his mouse. Just then, the IS staff heard a great rumbling noise and looked down the hall to see the entire accounting department striding toward them. It appeared that the **Unclean Masses** were on their way to discuss the new accounts receivable package. It was going to be a long day for IS.

The 5th Wave *by* Rich Tennant

Inside Lines

Packing [illegible]

Reports [illegible] Microsoft's next generation [illegible] test version [illegible] ODI and [illegible] things, could [illegible] making Chicago [illegible] of 4M bytes [illegible] some [illegible] bytes of [illegible]

Getting [illegible]

Microsoft [illegible] of its Lulu versioning tool for software development until the fall, according to industry sources. The product, dubbed Sourcesafe Line Management, or "Slime" internally, is scarcely being used in-house due to performance and other problems. It is now going through a second beta test, the sources said. It was originally scheduled to ship in March.

Playing it safe . . . for now

Before it makes its major systems launch this fall (see story page 1), Compaq will introduce a two-processor version of its SystemPro/XL, according to Virgil Hornstein, director of systems marketing. Hornstein said this would cap out the XL line — a surprise, because Compaq had said the XL would support four processors when the company introduced it. The four-processor version was expected by this summer. The fall announcement will include support for four processors and software to run on them.

Power-full

The second-generation EV6 version of DEC's Alpha AXP microprocessor, due out in the second half of next year, will likely exceed a 30W maximum power consumption goal that DEC has set for the RISC technology. DEC was already too far into the product definition stage on EV5, which it will market as the DECchip 21164, when it decided that 30W was the appropriate upper power limit for future devices. The company hopes to keep the third-generation EV6 microprocessor that is scheduled for introduction in 1996 under 30W but is having to devote a lot of engineering time to come up with a way to do so.

DOE, a dear

After two years of gestation, Sun Microsystems' SunSoft business unit is about to give birth to Distributed Objects Everywhere (also known as Project DOE). Sun hinted at DOE during last summer's Object World in San Francisco, but it is making a formal announcement at this week's reprise of the same object-oriented event. A DOE developer's tool kit will be delivered to selected SunSoft users and developers via CD-ROM by next month, Sun sources said.

Integration netting

CMIP, the much-maligned "official" network management protocol, was an unexpected participant at InterLab's New SNA conference last week. IBM networking director Rick McGee confirmed again that IBM plans to integrate SNMP and Common Management Information Protocol for managing current and future versions of its APPN internetworking architecture. Cabletron hinted that its Spectrum platform would do the same thing as a way for managing SNA LAN internetworking.

Just as the movie Jurassic Park hits the theaters, the computer makers who worked behind the scenes are starting to take their bows. The images of giant dinosaurs that amble and run throughout the flick were generated on Silicon Graphics workstations at Industrial Light & Magic in California. Meanwhile, rival Sun Microsystems noted that Jack Horner, the Montana scientist who consulted on the film, used a Sun SPARCstation to analyze CAT scans of dinosaur fossils. Rivalry, it seems, has not evolved much since the Jurassic Age. Phone, fax or CompuServe News Editor Alan Alper with news tips at (800) 343-6474, (508) 875-8931 or 76537,2413, respectively. Or try Computerworld's 24-hour voice-mail tip line at (800) 220-8555.

The One You Haven't Done Could Be Your Undoing.

As you move to client/server computing, you'll undoubtedly spend countless hours evaluating GUI tools, sorting through network solutions and resolving platform issues. But past experience will tell you that managing your data is just as important. In fact, it's key to delivering information to your users when and where they need it–and making sure it's the right information.

To help you address the issue of data management in a distributed environment, we've developed a useful guide that's yours free. For your personal copy, return this coupon or phone us at **1-800-BACHMAN. In Canada, call 1-800-445-0854.**

Successfully implementing client/server computing isn't easy. But if data management is high on your list, you'll be well on your way to getting the job done.

NAME_____

COMPANY_____

ADDRESS_____

CITY_____ STATE____ ZIP_____

Send to: Data Guide, Bachman Information Systems, 8 New England Executive Park, Burlington, MA 01803
Or phone toll-free **1-800-BACHMAN**

BACHMAN

©1993 Bachman Information Systems, Inc. All rights reserved.
GS00K92AGS5990 Option year one

PDSFAST

It's About Time!

Join the Thousands of MVS Installations Worldwide That Use PDSFAST to Save Time and Money in the Following Critical Areas:

• DASD/SPACE Management-PDSFAST interfaces transparently with all existing DASD Management systems, reclaiming more space and saving up to 90% of the time and resources used. SPEAK TO ANY OF THE OVER 7,500 CONTRACTED PDSFAST USERS WHO, COMBINED, HAVE VIRTUALLY EVERY MAJOR DASD MANAGEMENT SYSTEM AVAILABLE, AND THEY WILL TELL YOU "No DASD management configuration is complete without PDSFAST."

• CICS/DATABASE Libraries — PDSFAST copies and compresses CICS and Database libraries in a fraction of the time presently used. Typical elapsed time for a copy or compress of screen libraries, and other similar datasets goes from about 40 minutes to under 1 minute. PDSFAST eliminates unnecessary system downtime spent waiting for copy and compress operations to complete.

FULL IEBCOPY REPLACEMENT INCLUDING PDSE

Whether you stay with the PDS format or go to PDSEs, PDSFAST delivers immediate system-wide improvements to save you time and money, furnishing the performance benefits and quality that you expect from SEA.

• SMP Processing — SMP and SMP/E both dynamically invoke IEBCOPY thousands of times during a typical run. PDSFAST reduces SMP and SMP/E run time and resource consumption by over 75%.

PDSFAST is now used at over 7,500 MVS installations worldwide. PDSFAST provides a competitive advantage for MVS installations of all sizes, saving many thousands of dollars in data center resources daily. PDSFAST is also saving thousands of individuals many hours of unnecessary time spent waiting for work to be completed.

Isn't It About Time You Had The PDSFAST Advantage!

For further information call 1-800-272-7322.

SEA™ ***SOFTWARE ENGINEERING OF AMERICA®***
1230 Hempstead Turnpike, Franklin Square, New York 11010
(516) 328-7000 1-800-272-7322 Fax: (516) 354-4015

Products Licensed In Over 50 Countries